Chemical Lib. MAR 22 1917
Univ. of Wisconsin Library

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CXXXVII. No. 2807.] LONDON, FEBRUARY 27, 1917. [69th Year. Price 6d.

O'NEILL'S
OXIDE
GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

THE UNITED FLEXIBLE METALLIC TUBING CO., LTD.
FOR GAS OILS & HIGHEST STEAM PRESSURES
112, QUEEN VICTORIA St E.C.
Works: PONDERS END MIDDLESEX

TORBAY STOVE BLACK FOR GAS COOKERS.
The TORBAY PAINT CO.,
26, 27, & 28, Billiter St., London, E.C.
39-41, Old Hall St., Liverpool.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.,
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office:
39, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL, NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

ESTABLISHED — 1861 —
Telegrams: "DRY METERS, LONDON."
Telephone: KENSINGTON, 1140.

George Glover and Co., Ltd.
RANELAGH WORKS
Royal Avenue, Chelsea
— LONDON, S.W. —

Highest Awards at the Principal International Exhibitions.
Branches at LEEDS (9, Dewsbury Road) and MANCHESTER (Gaythorn Meter Works, Easton St.).

SPECIALISTS IN DRY GAS METERS—SLOT, KEY, AND ORDINARY.
Every meter leaving George Glover and Co.'s works, irrespective of size—and they build up to 3000 Lights—is regulated and tested for soundness at 12 in. pressure, and for registration not only at the ½ in. pressure prescribed by the "Sales of Gas Act," but at 3 in. pressure with full outlet capacity, so as to prevent "slow" registration even when the meter is overworked.
AGENTS FOR THE PATENT M. & M. SELF-LOCKING SLOT METER PADLOCK.

SOLE MAKERS OF THE NORTHERN & COAL WASHER. T. & J. BRUNTON, LTD., 54 & 3356 Manchester.

RITCHIE C.I. PIPES FOR GAS & WATER. MIDDLESBROUGH.

HIGH PRESSURE GAS PLANTS

BOOSTING FANS, ROTARY & RECIPROCATING COMPRESSORS,
DISTRICT & SERVICE GOVERNORS.

GEO. WALLER & SON, Phœnix Iron-Works, STROUD, GLOS.

BOYS CALORIMETERS

WITH TABLES, FORMULÆ, AND HYGROMETERS

for converting results of Test into

TOTAL HEAT B. TH. U.S

ALEXANDER WRIGHT & COMPANY, Limited, WESTMINSTER.

AGENTS: Australia—FYVIE & STEWART, 360, Collins Street, Melbourne. Canada: W. P. ROPER, 502, Merchants' Bank Building, Montreal.

TAR, LIQUOR, & WATER PUMPS

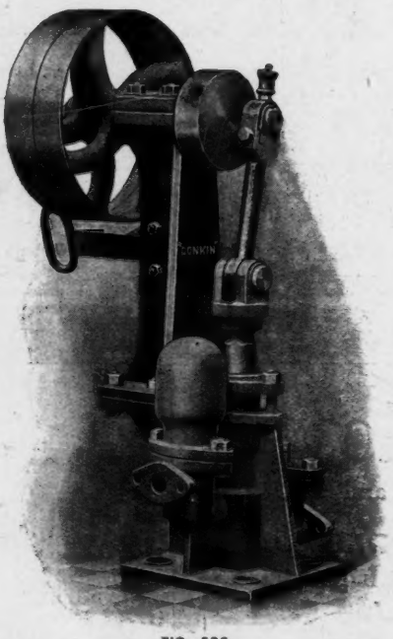


FIG. 536.

MADE IN TEN SIZES.

Can be arranged for Working by Power or Hand.

BEST WORKMANSHIP.
PROMPT DELIVERY.

Particulars sent on Application.

Makers of all types of Valves for Gas, Water, Liquor, and Chemicals, including Double-Faced Valves and Quick-Opening Valves.

GAS EXHAUSTING PLANTS OF ALL SIZES.

THE BRYAN DONKIN COMPANY, LD., CHESTERFIELD.

London Office: MILLBANK HOUSE, Wood Street, WESTMINSTER, S.W.

Chesterfield Telephone No. 84.
London Telephone No. 8338 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin Vic. London."

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXXXVII., No. 2807.] TUESDAY, FEBRUARY 27, 1917. [69TH YEAR.

EDITORIAL NOTES.

Institution Meeting and Current Problems.

THERE is a contribution to our "Correspondence" to-day from Mr. W. R. Herring, which we believe reflects a not inconsiderable body of opinion among the members of the Institution of Gas Engineers. The industry is now passing through a period not only of considerable temporary difficulty, but one in which new conditions are being moulded which are weighted with large significance in relation to the future of the industry. But from all visible signs, the Institution, in its corporate state, is quite oblivious of what is passing, of what is expected of it, and of what should be its position in regard to these matters. It has become the fashion for the war period for members to be called together once a year to transact, amid all the momentous happenings bearing upon the material interests of the industry itself, practically only purely formal business affecting the conduct of the Institution. This was, perhaps, all very well the first meeting in war time; but the June of 1916 was not the June of 1915, and the June of 1917 will not be the June of 1916. The rule of precedent should not now apply. Much has occurred even in the last twelve months. Development comes upon development; and with each change new considerations and new problems open up. In none of these vital movements do the Council of the Institution see anything which it would be in the interests of the industry that its professional members should collectively discuss, nor in any of them do they see anything in which the Institution, as the supreme technical body in the industry, is called upon to take the lead in action. With the trend of development we shall soon see, unless the Institution bestirs itself, the technical lead transferred to the Chemical Societies, and the Institution tailing-after. Mr. Herring shows the large field of topic that recent developments have opened up; and he catalogues some of the subjects, but not by any means all, that should be submitted to open debate by the members of the Institution—not only for the sake of avoiding another practically barren meeting, but for moulding definite policy and action, and for the Council to secure proper mandates from the collective wisdom of the members. Some of the subjects named in the letter, certain members might find it inconvenient to discuss; but temporary individual inconvenience has to go under in the face of permanent industrial interests. We will not here discuss any of the subjects named by Mr. Herring; but a single passage in his letter invites reference. Remarks our correspondent: "Even to-day, there is a large number of men who believe that the candle power is no indication of the calorific value of a town's gas, whereas the records of the London County Council testings show conclusively that such an impression is wrong." In conjunction with the County Council testings, study might be made by Mr. Herring of the illuminating power and the calories columns of the first two tables given on p. 344 of last week's issue. In one place he will see that a 14-candle gas indicated 141 calories, and a 3·8-candle gas 133·8 calories! Every line affords further similar illustration.

Differing Calorific Power and Lighting Values.

IN our "Correspondence" columns last week, there appeared a letter correcting one or two errors in the evidence of Mr. E. S D. Moore at the Board of Trade inquiry into the application by the South Suburban Gas Company for the revision of their calorific value standard, and its application throughout their district, instead of, as now, a comparatively small part being still under an illuminating standard. Mr. Moore is the technical expert in the Lighting Department of the London and North-Western Railway; and his evidence was given on behalf of the South-Eastern and Chatham Railway Managing Committee. Since then we have received from the Lighting Department at Euston Station two tables, containing some interesting data, which are published in another part of the "JOURNAL." The first table supplies results, tabulated from numerous tests carried out with different calorific value grades of town gas, showing the approximate increased or decreased consumption required to maintain the *same* candle power. In the second table are figures *calculated* from those in the first table with the view of showing that the operating efficiency of burners is reduced by depreciation of the calorific value.

Now we submit that the figures presented in these tables have not any great value, and for the reason that the basis on which they have been ascertained is altogether wrong. Each burner has been run, with gases varying from 440 to 520 B.Th.U., to realize with these gases a uniform illuminating power—30 c.p. with one type of burner, and 50 c.p. with the other; the other lights, the 60 c.p. and the 100 c.p., being merely doubles of those burners. Testing in this way does not allow one to get the maximum illuminating power from the burners with different grades of gas. The burners should have been run to maximum candle power with each grade of gas, in order to have done full justice both to the gas and to the burner; and then, if the investigators cared, the results could have been calculated down to a common basis—say, to 30 and 50 c.p. respectively—to show the consumption of gas for these given powers. Putting the illuminating power at a fixed point, and controlling the gas so as to secure this particular power, must prejudice flame temperature with some of the qualities of gas, seeing that each quality requires a different quantitative supply of air; and the proper supply of air is that which the gas needs to produce at the mantle the maximum flame temperature (and thus candle power) with the gas being consumed. The test conditions point to a check having been applied, through the fixed candle power, to the efficiency of both the burners and the gas.

Now take the second table, composed of data as to the candle power per cubic foot ascertained by calculation from the figures in the first table. Here we get some incongruities which indicate that the method of testing has somewhat vitiated what the investigators set out to prove. As the investigators burned the gas, we get a gas of 500 to 510 B.Th.U. giving an efficiency of 20·4 c.p. per c.ft. in the 30-c.p. burner, while the 440 to 450 B.Th.U. gas—60 B.Th.U. lower value—when consumed in two 50-c.p. burners gave 20·5 c.p. per c.ft. There is no difference here in the illuminating power efficiency of the two widely differing calorific value gases per cubic foot, so that by this one comparison alone, without other considerations, the contention that the tables are intended to support is not upheld. Then we should like to know why, taking the first line as an illustration, a 440 to 450 c.v. gas should give 16·9 c.p. per cubic foot in a nominal 30 c.p. burner, but when two of the same 30 c.p. burners are put together an efficiency of 18·7 c.p. per cubic foot is obtained. The same differences apply to the single and double 50 c.p. burners. We get, too, the two 30-c.p. burners showing the same efficiency per cubic foot as the single 50-c.p. burner, though when a single 30 c.p. burner is used separately, the figures are inferior to those from the 50 c.p. burner and from the two 30 c.p. burners. If the gas is being burned correctly, and the other conditions are uniform, we can see no reason with 30 and 50 c.p. burners —whether used singly or in pairs—why the efficiency per

cubic foot of the same calorific value gas should not be approximately the same. The figures condemn themselves. The only explanation we can give is that the burners, as already said, were not run to their maximum light capacity with the different calorific value gas, but were stifled in their operation by the adoption of the nominal candle powers of the burners as the object to be realized.

Incidentally, it would be interesting to know what calorimeter and photometer were used for the tests, as well as the conditions of their use—that is to say, whether the prescriptions for the types of instruments used were followed throughout. Supplementing this, we should also like to know the make of burners employed in the tests, and if the gas pressure was governed to a uniform rate throughout.

The Patriotism of the Gas Industry Impugned.

IN the ordinary course of things, we should treat with contempt certain discourteous remarks attributed to Alderman Merrells, of Swansea, by the "South Wales Daily Post." But in these days patriotism has a full meaning, and the men of the gas industry are desirous of standing, as they deserve to stand, in respect of patriotism in as good a light before their contemporaries as even the occupants of aldermanic benches. But, if Alderman Merrells is correctly reported, he is anxious to defame the patriotism of the men responsible for the conduct of privately owned gas undertakings, of which there is an excellent example in Swansea. We believe that the Swansea Corporation were represented on the deputation of municipal authorities that recently had an interview regarding the calorific value standard with Mr. Garnham Roper at the Board of Trade. The members of the deputation were anxious that the period at the end of which there should be liberty to apply for a revision of the calorific standard should be limited to a few months or (say) a year after the war, instead of five years from the date of the Order. This is the regulation period, and not five years "after the war," which error the deficient knowledge of the matter by Alderman Merrells led him to commit. He fears that the result of the interview with the Board of Trade will be entirely fruitless; and, in justice to gas undertakings, we think that is a very proper result.

Then the Alderman is reported to have proceeded: "He "wanted to say there was an utter want of patriotism on "the part of the privately-owned gas concerns in the king-"dom, because they were told that those people, when "asked to put down plant for the purpose of increasing "the amount of the bye-products for the use of the Go-"vernment, practically held a pistol at the head of the "Government, and said they must have the period for five "years after the war. That, to his mind, showed an utter "want of patriotism." We should like to know who was the author of such a piece of invention as that private gas undertakings had "practically held a pistol at the head "of the Government." Is the author to be found at the Board of Trade or the Ministry of Munitions, or is it pure imagination on the part of Alderman Merrells, of Swansea? Whether an actual statement by someone who ought to have known better, or whether imagination, there is no truth in it. The five years was merely decided upon from an impartial consideration of the conditions, and nothing more. At any rate, we do think it is due to the Swansea Gas Company that the statement should receive denial at the hands of the Ministry of Munitions with equal prominence to that which Alderman Merrells' defamatory remarks—defamatory of private gas undertakings—have already secured. There is an unpleasant flavour about the words and the manner in which they were used; and such attempts to disparage in the eyes of the public what gas undertakings are doing should once and for all be stemmed by the authority who is able to stem them. As a matter of fact, privately owned gas undertakings have done more without Government assistance in this patriotic work than municipally owned ones; and some of them will never, with the present intangible profits arising from the oil-washing process, under present conditions recoup their outlay within the period of the war. There is more patriotism behind all this work than certain people, in their ignorance, have ever contemplated or could manifestly give gas undertakings credit for. It is a great pity that some municipal minds cannot view the doings of any private enterprise, except quite probably their own, in a broad and fair spirit. However the main thing is that there should be proper denial of the publicly-made Swansea aspersion.

Stripping Part of the Gas Make.

AN article notable for the amount of valuable information it contained in brief space on the subject of the oil-washing of gas for benzene and toluene was that contributed to our columns last week by Mr. W. G. Adam, B.A., the Manager of the Tar and Ammonia Products Works at Beckton; and from it may be gathered the method on which oil-washing operations are being conducted by the Gas Light and Coke Company. There has been an undue amount of secrecy as to the experimental and working experiences of the London Companies in this particular, mainly owing to the absurd prohibition ruling at one time even as to publication on broad lines, as though contemporary German intelligence fell short of the level at which it could divine that our supplies of high explosives were not obtained and maintained without work proceeding at all the main available sources of benzene and toluene. It would have been equally as clever to have suspected them of not being aware that chickens were the sources of our egg supplies. While this reticence until comparatively recent times has not served us any good purpose with the enemy, it has had the bad effect—which has in a way served the enemy—that a good deal of experimental ground has been passed over many times at different works, a great part of which might have been saved by an amount of intelligent liberty as to publication, and thereby greater efficiency generally might have been attained at a quicker pace. However, silence has not meant inactivity; and one of the most active of the concerns in the matter has been the Gas Light and Coke Company, as acknowledged by us in our editorial columns a fortnight since. The Company was one of the first to investigate and adopt oil-washing, and to continue it ever since on a progressive scale; for the low-efficiency tar-washing process never had any real attractions for its Chief Engineer (Mr. Thomas Goulden) and the chemical staff.

The article by Mr. Adam shows that the method of oil-washing practised by the Company has been developed step by step by research and experiment, and that at any rate in one respect the system of operation (if we interpret a passage of the paper properly) differs from the general procedure—the departure being justified by the results that are presented both in the text of the article and in the tabulated data. Before experimenting to ascertain the efficiency of various wash-oils, the conclusion arrived at from theoretical consideration was that the best would be one which was of the maximum boiling-point, consistent with sufficient fluidity at ordinary temperatures; and the subsequent experiments demonstrated that considerable advantages were to be derived from the use of green oil. It gave a high absorption efficiency, a crude spirit that contained a low percentage of heavy oil, and low naphthalene content of the gas. Practically speaking, every class of wash-oil has had its votaries; and the practitioners each appear to find in his particular preference something or other that is superior to the choice of other workers. No doubt, too, the Gas Light and Coke Company are in a position to obtain all the green oil they require, which would not be the case with every undertaking oil-washing its gas. Furthermore, some users have found that it has a bad effect on the gas, which has to be compensated by the use of an extra rich carburetted water gas. This is not a thing to be contemplated with gas oil at the price that is being paid to-day by those who have not sufficient coal-carbonizing plant to meet their requirements, or cannot secure adequate supplies of coal. But this is where the value of Mr. Adam's article comes in. Method in the use of the green oil avoids all such difficulties, and produces economical effects which are in these times worth noting.

Let us bring into focus the main beneficial effects as presented. With green oil, as seen, a high efficiency in absorption is realized; thus less oil has to be circulated. This results in increased capacity of the scrubber, heating, cooling, and distilling plant, and economies in both steam and cooling water. Several other beneficial effects are named in the article; among them being the reduction of sulphur compounds and naphthalene. To many managers we have here a condition in which they devoutly desire to be. It is that it is possible to keep the naphthalene down to 4 grains per cubic foot, and, after old deposits are removed from the distributing mains, no stoppages (even in the smallest services) have been experienced. But these desirable naphthalene effects are only obtained by the complete stripping of the gas treated; and this is where the method pursued is

the all-important factor. Troubles arise from half measures, by which naphthalene is removed in the oil-washing process accompanied by the solvents and other heavy hydrocarbons. Hence trouble from the remnant naphthalene; and hence, too, the weight of counsel that there is in Mr. Adam's words: "It is obviously better to strip a small "quantity of gas thoroughly than a larger volume partially." We take it that this is the mode of working which is adopted by the Company, and the one that contributes such favourable naphthalene experiences. The tabulated figures given on p. 344 in regard to treated gas from a 100,000 c.ft. experimental plant are very informative in regard to illuminating power, calorific value, naphthalene, and sulphur. They show a drastic effect on the illuminating power, a moderate effect on the calorific value, and satisfactory results as to naphthalene and sulphur. There is no need for enrichment with such a gas as this, looked at from the calorific standpoint; and, if this gas is used as a diluent of untreated gas, then enrichment is a matter that can be entirely banished from the mind, whatever the supply conditions. There is one thing that is not observed in the article, and it is (assuming we are right as to this being the method of working) the proportion of treated to untreated gas.

There are several other parts of the article that have peculiar interest at the present time—such as the one referring to the long deprivation of the country of the advantages that can be realized from the oil-washing of town gas, which advantages have been denied through short-sighted obstructionists, and the steady adherence of the gas industry to the ruts formed by its traditional procedure in regard to its secondary products. A most important matter refers to the future. Mr. Adam rightly considers the time is opportune for the formation of a Benzol Association, for doing certain things which shall work for the benefit of the future of the home trade. This is a subject with which we dealt more fully in an article headed "What of 'After the War'?" in the "JOURNAL" for Feb. 6 (p. 242).

Industrial Organization and Production.

A PREVALENT characteristic of the people of this country is the disparagement of the native power of organization. Perhaps this is not a failing in judgment that is to be altogether deprecated, as the recognition of a shortcoming from the standards set by others is oftentimes a powerful incentive to some fresh effort. Germany is frequently cited as a country with a power of organization superior to our own. Perhaps she has proved this in certain directions; but that she has done so, does not supply any authority for saying that organization before the war was non-existent in this country, and that in other quarters the power of organization was not even latent. Organization was existent, and there was plenty of latent power that only required the necessary stimulus to bring it into active and purposeful operation. Our own Government had supplied a very poor criterion in the matter of organization. A policy of perpetual drift had landed the country in a political morass in which the larger material interests which combined to promote its prosperity and safety were completely ignored by the Government, and were left entirely to private enterprise, ability, and effort. But among the revelations of the war has been the large latency of the power of organization; for no country where this power was non-existent could have done what has been accomplished in connection with the Army, the provision of munitions, food supplies, and so on. And no country could have done these things, especially in connection with the production of munitions, if the power of organization had not previously been at work in our industries, and had made it possible to readily adapt factories and workshops to meet the requirements of the war. We have seen the evidence of organization in practice on the most exact and liberal lines in many industrial places; and this organization has been a valuable asset to the country in the great crisis that it was suddenly called upon to pass through. Besides all the organization, there has been found in these factories a ripened technic, as well as brains sharpened by practice and experience.

In another part of this issue an example of this is given, suggested by a visit to the works of Messrs. John Wright and Co., of Birmingham and elsewhere. There we had substantial witness of how prior organization had enabled the firm to divert with alacrity a large part of the operations of their works and plant from the productions of peace times to productions essential for making the most active of the instruments of destruction for the war. A remarkable and impressive sight was afforded by the numbers of furnaces of many sizes, shapes, lengths, and heights in their various stages of construction, and these merely the successors of numerous others that were already in active service helping to meet exigent needs in prosecuting the war. Some of the furnaces were as much as 30 ft. in length with chain conveyors running through them; and others—there must have been a score of them just finished ready for despatch—contained tilting crucibles each with a capacity of 600 lbs. of metal at a charge. The furnaces already installed by the firm for munitions work during the war, if operating simultaneously and continuously, would mean a demand for approximately 1,600,000 cubic feet of gas per hour. The works of the firm only form one group of many which, through the bestowal upon them in times past of similar fine organizing skill, are turning out vast work through the agency of which immense interests are being served.

Could we to-day but follow gas-furnace productions—from weighty shells down to (say) the helmets of our soldiers—from these numerous factories throughout their journeys to their final use, there would be a romantic tale to tell. We look at one of these heavy gas-furnaces, think of it as a gas-consuming device, and probably give a passing thought to the character of the work it is called upon to perform. But if we let imagination dwell upon, or could actually see, the work that its productions were going to perform, we should think much more respectfully and profoundly of the furnace itself, the structural parts and efficiency of which in all sizes have been advanced in remarkable manner by the war. The war, in fact, has planted deeply in industry generally the roots of gas-furnace work; and the gas industry will permanently benefit from this—thanks foremost to the manufacturers of the furnaces, whose organization enabled them to sharply respond to the call upon them. The same organization will enable them, with the restoration of peace, to revert just as promptly to every demand the gas-supply industry may make upon them in the larger work which to-day it discerns upon its horizon, and for meeting which it, too, must see that the organization of every unit is fully prepared.

Gas-Fires and Cold Weather.

Bumping and inconvenient increases in gas demand continue to be illustrated. Two samples were quoted last week; and this week the South Suburban Gas Company and the Croydon Gas Company supply two more. There is good elasticity about the manufacturing plant of a well-ordered gas-works; but even "well-ordered gas-works," if capital authorization is withheld, if maintenance cannot be kept up to its usual standard through want of material and labour, and if coal and oil supplies are curtailed, have their ability to meet widely varying demands seriously contracted. In such circumstances, yet another difficult position arises, as was pointed out by Mr. Charles Hunt in his address at the South Suburban Company's meeting. These meteoric flights in consumption are due to the heating branch of the business during the severely cold weather; and they are contingencies which have to be provided for, and which the industry is perfectly willing to accept, though they form a partial set-off to the profitableness of business in normal times. But if extensions of plant cannot be made before next winter, and the present conditions as to raw and other materials and labour continue until then, it is a question for consideration, Mr. Hunt says, whether in the case of the South Suburban Company, prudence will not dictate a limit being temporarily placed on the further fixing of gas-fires. Of course, this is a question that would have to be determined by each concern, as the conditions as to manufacturing margins, and ability to meet sudden large additional demands for gas, vary considerably as between different undertakings. It is hoped that as little as possible restriction, in the case of any undertaking, will be placed upon the gas-fire requirements of consumers; for restriction when a thing is most required must have a bad permanent effect. However, in one fortnight alone of the low-temperature period, the South Suburban Company had a daily increase of gas consumption, compared with the corresponding period of last year, of from 30·4 to 59·7 p.ct.—the average

increase for the fortnight being 41·5 p.ct. The gas output from Jan. 1 to the day prior to the meeting increased by 28·2 p.ct. In the case of the Croydon Gas Company, the average increase in the same period was 21·5 p.ct. With some satisfaction Mr. Hunt, at the South Suburban meeting, referred to the fact that the cooking and heating appliances on hire in the Company's area had reached the high average of 105·7 per 100 consumers; with equal satisfaction, the same afternoon, Mr. Charles Hussey, in his address to the Croydon proprietors, referred to their average of 107 stoves on hire per 100 gas accounts. These are figures with which the gas sales departments of other gas undertakings will be making comparison; and they are figures which the friendly rivalry that exists in the gas industry will seek to exceed.

Intrinsic Brilliancy and Brilliant Fallacies.

The members of the Illuminating Engineering Society were last Tuesday treated to a useful paper by Dr. James Kerr, of the Public Health Department of the London County Council, which should assist in persuading those who deal in high intrinsic brilliancy lighting agents that they have a responsibility upon them to do all within their power to stop the promotion of eye infirmities. To this responsibility, it is feared, very little heed is paid; and we are sorry to see attempts being made to minimize the evil by a contortion of the facts. Stockhausen and others have shown that the intrinsic brilliancy of the low-pressure incandescent gas-mantle is not more than from 3 to 6 candles per square centimetre (according to the efficiency of the burner); while tungsten filament lamps are as high as 150 to 180 candles per square centimetre. Now, Mr. A. P. Trotter and Mr. A. Cunnington, speaking in the discussion on Dr. Kerr's paper, appear to think that this great difference should be narrowed, by the processes of optical illusion and of mental deception by adding something to the incandescent area of the metallic filament, and in the case of the latter gentleman by deducting something from the incandescent area of the gas mantle. Mr. Trotter wishes to bring to the credit of the area of the light source of the metallic filaments the phantasmagoric abilities of the eyes of different persons. In his opinion, the intrinsic brilliancy should not be taken on a micrometer measurement of the filament itself, but on the filament *plus* irradiation as the eye sees it, which irradiation gives the filament about ten times the width of the actual thing. That is to say, the area of the filament will be with different persons just that which is promoted by irradiation—an inconstant quantity with different persons, and varying according to the time that the incandescent filament is under inspection. There is not the slightest reason why the eyes, knocked out of normal condition by the high intrinsic brilliancy of the filaments, should not see the bulbs of lamps completely filled with incandescence. All that can be truly claimed as the area of the light source is the actual filament microscopically extended by the high temperature at which it is run.

A Queer Claim and Comparison.

Mr. Cunnington also thinks that an injustice is done to the metallic filament lamp. He claims nothing for the irradiation of the filaments—in fact, he finds eye relief from the high intrinsic brilliancy in the large open spaces existing between the filaments. Therefore, the whole of the space occupied and bounded by the filaments should be claimed as the source of light, and on this area the intrinsic brilliancy should be calculated. It is a pity Mr. Cunnington stopped there. The "relief" afforded to the eye cannot be limited to the space occupied by the filaments; it should extend beyond—say, for the radius of a foot or a yard, or, for the matter of that, the whole field of vision of the filament-inspecting eyes might be taken in the computation of intrinsic brilliancy. This would be quite as logical as Mr. Cunnington's notion. He cannot get away from the fact that what actually happens is that the large spaces between the filaments help to give them stronger definition when in the incandescent state. Mr. Cunnington appears to make his claim on the ground that the whole area of the incandescent mantle is taken in assessing for intrinsic brilliancy, while it is a woven mesh, also with open spaces between the threads. Look on the spaces in the metallic filament lamp and on those seen by the naked eye in the cold mesh of a mantle, and then the observer is at liberty to smile at Mr. Cunnington's ingenious suggestion. Consider then the facts pointed out by Mr. J. G. Clark in the discussion. In effect, he said the threads composing the mantles are of villose character, the fibrous projections practically filling the spaces in the mesh with incandescence, besides which through any open spaces come the incandescence of the inside surface of the opposite part of the wall of the mantle. There we have practically a solid source of light from the area of which deductions cannot be made in computing intrinsic brilliancy without recourse to the higher mathematics. Better for the electrical partisans or the illuminating engineering purists to keep to the truth and exact conditions than try to minimize what is becoming more and more recognized by ophthalmic students as an evil that must be averted by protecting screens and globes, or means of indirect or semi-indirect lighting. While writing upon this subject, it may be pointed out that Mr. Cunnington approached very close to the violation of the rule of impartiality which the Society has hitherto prided itself upon maintaining.

A Coal Output Report.

With so much pressure for this issue on the restricted number of "JOURNAL" pages available, it is necessary to hold over until next week publication of the comparative figures usually abstracted from Part III. (Output) of the Home Office Annua Report on Mines and Quarries. In postponing a fuller notice of the statistics, it will be admitted that one more week will not make any very great difference, seeing that the figures, which were officially issued only five or six days ago, are already considerably belated—referring, as they do, to the year 1915. That is a long while to look back now; and many things have happened in the meantime. But these things, of course, have not been of a nature calculated to facilitate the preparation of Departmental Blue-Books. Though, therefore, the statistics on the present occasion are in a much more restricted form than was the custom in pre-war times, there is no reason for surprise in the fact that they make their appearance at a considerably later date than usual. Among the tables which are excluded from the present report are those relating to exports and imports; but these figures have hitherto been obtainable elsewhere, and have, as a matter of fact, been recorded from time to time in the "JOURNAL." Briefly, the total output of coal in the year 1915 was 253,206,081 tons, and the value £157,830,670—showing a decrease in the output of 12,458,312 tons, and an increase in the value of £25,233,817 on the figures for 1914, which were 265,664,393 tons and £132,596,853 respectively. The average price of coal at the pit's mouth was 12s. 5·6d. per ton in 1915, as compared with 9s. 11·79d. in the previous twelve months. After meeting the export and steamer requirements for the year now under notice, the amount of coal remaining for home consumption was 193,254,156 tons, or 4·193 tons per head of the population. Calculating from the year 1873 to the end of 1915, the total value of the coal raised has been £3,241,021,908, and the quantity 8,459,449,000 tons. Of this amount, something more than 24½ p.ct. has been shipped abroad as exports in the form of coal, coke, and manufactured fuel, and as coal used for steamers engaged in foreign trade.

OBITUARY.

We much regret to learn that the death occurred suddenly on the 11th inst. of Dr. E. J. CONSTAM, Professor at the Zürich Polytechnic, and Head of the Swiss Federal Fuel-Testing Laboratory, which he founded about twelve years ago at the request of the Swiss Government. Researches of a fundamental character on the valuation of different coals and oils for gas-making and fuel purposes, which he carried out independently or in conjunction with Dr. Schläpfer and other collaborators, have been reported from time to time in the "JOURNAL." He was personally well known to many English gas men through his frequent visits to this country, and his readiness to assist, even at great sacrifice of time and trouble, those who attended as delegates the international congresses held at Zürich. Though, we believe, an American by birth, he had made Switzerland his country and Zürich his home for over thirty years. His death, while still in possession of full capacity for work, will be a great loss to all concerned with the examination and use of fuel. The funeral (cremation) was fixed for the 14th inst.

"Do Fire-Clays contain Halloysite or Clayite?" is the title of a paper which Dr. J. W. Mellor is to read before the Ceramic Society on the 10th prox.

Fig. 13.—"LOPRESS-REGENERATIVE" ANNEALING FURNACE.

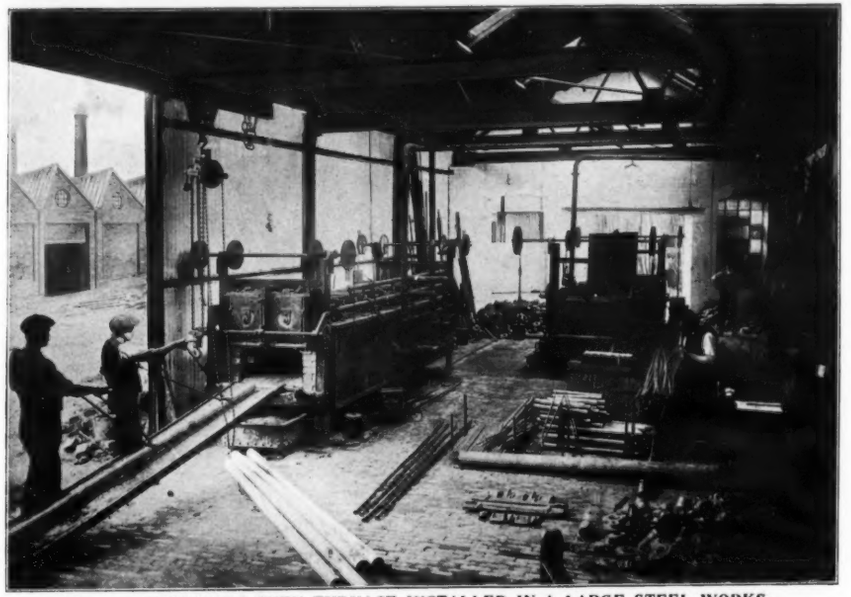


Fig. 14.—ANNEALING OVEN FURNACE INSTALLED IN A LARGE STEEL WORKS.

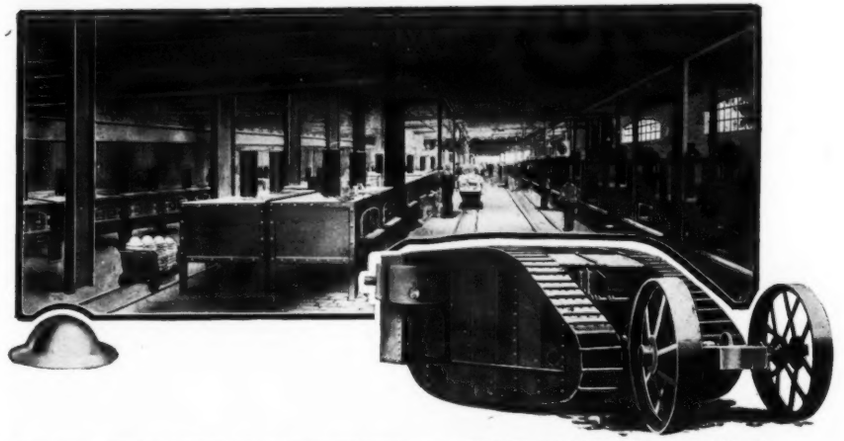


Fig. 15.—INSTALLATION OF GAS FURNACES IN A WORKS MAKING STEEL HELMETS AND "TANK" PLATES.

ORGANIZATION AND MEETING THE NEEDS OF THE WAR—At the Combined Works of John Wright & Co.

Illustrations to Accompany the Article on this Subject in the Current Issue of the "Journal."

increase for the fortnight being 41·5 p.c. The gas output from Jan. 1 to the day prior to the meeting increased by 28·2 p.c. In the case of the Croydon Gas Company, the average increase in the same period was 21·5 p.c. With some satisfaction Mr. Hunt, at the South Suburban meeting, referred to the fact that the cooking and heating appliances on hire in the Company's area had reached the high average of 105·7 per 100 consumers; with equal satisfaction, the same afternoon, Mr. Charles Hussey, in his address to the Croydon proprietors, referred to their average of 107 stoves on hire per 100 gas accounts. These are figures with which the gas sales departments of other gas undertakings will be making comparison; and they are figures which the friendly rivalry that exists in the gas industry will seek to exceed.

Intrinsic Brilliancy and Brilliant Fallacies.

The members of the Illuminating Engineering Society were last Tuesday treated to a useful paper by Dr. James Kerr, of the Public Health Department of the London County Council, which should assist in persuading those who deal in high intrinsic brilliancy lighting agents that they have a responsibility upon them to do all within their power to stop the promotion of eye infirmities. To this responsibility, it is feared, very little heed is paid; and we are sorry to see attempts being made to minimize the evil by a contortion of the facts. Stockhausen and others have shown that the intrinsic brilliancy of the low-pressure incandescent gas-mantle is not more than from 3 to 6 candles per square centimetre (according to the efficiency of the burner); while tungsten filament lamps are as high as 150 to 180 candles per square centimetre. Now, Mr. A. P. Trotter and Mr. A. Cunnington, speaking in the discussion on Dr. Kerr's paper, appear to think that this great difference should be narrowed, by the processes of optical illusion and of mental deception by adding something to the incandescent area of the metallic filament, and in the case of the latter gentleman by deducting something from the incandescent area of the gas mantle. Mr. Trotter wishes to bring to the credit of the area of the light source of the metallic filaments the phantasmagoric abilities of the eyes of different persons. In his opinion, the intrinsic brilliancy should not be taken on a micrometer measurement of the filament itself, but on the filament *plus* irradiation as the eye sees it, which irradiation gives the filament about ten times the width of the actual thing. That is to say, the area of the filament will be with different persons just that which is promoted by irradiation—an inconstant quantity with different persons, and varying according to the time that the incandescent filament is under inspection. There is not the slightest reason why the eyes, knocked out of normal condition by the high intrinsic brilliancy of the filaments, should not see the bulbs of lamps completely filled with incandescence. All that can be truly claimed as the area of the light source is the actual filament microscopically extended by the high temperature at which it is run.

A Queer Claim and Comparison.

Mr. Cunnington also thinks that an injustice is done to the metallic filament lamp. He claims nothing for the irradiation of the filaments—in fact, he finds eye relief from the high intrinsic brilliancy in the large open spaces existing between the filaments. Therefore, the whole of the space occupied and bounded by the filaments should be claimed as the source of light, and on this area the intrinsic brilliancy should be calculated. It is a pity Mr. Cunnington stopped there. The "relief" afforded to the eye cannot be limited to the space occupied by the filaments; it should extend beyond—say, for the radius of a foot or a yard, or, for the matter of that, the whole field of vision of the filament-inspecting eyes might be taken in the computation of intrinsic brilliancy. This would be quite as logical as Mr. Cunnington's notion. He cannot get away from the fact that what actually happens is that the large spaces between the filaments help to give them stronger definition when in the incandescent state. Mr. Cunnington appears to make his claim on the ground that the whole area of the incandescent mantle is taken in assessing for intrinsic brilliancy, while it is a woven mesh, also with open spaces between the threads. Look on the spaces in the metallic filament lamp and on those seen by the naked eye in the cold mesh of a mantle, and then the observer is at liberty to smile at Mr. Cunnington's ingenious suggestion. Consider then the facts pointed out by Mr. J. G. Clark in the discussion. In effect, he said the threads composing the mantles are of villose character, the fibrous projections practically filling the spaces in the mesh with incandescence, besides which through any open spaces come the incandescence of the inside surface of the opposite part of the wall of the mantle. There we have practically a solid source of light from the area of which deductions cannot be made in computing intrinsic brilliancy without recourse to the higher mathematics. Better for the electrical partisans or the illuminating engineering purists to keep to the truth and exact conditions than try to minimize what is becoming more and more recognized by ophthalmic students as an evil that must be averted by protecting screens and globes, or means of indirect or semi-indirect lighting. While writing upon this subject, it may be pointed out that Mr. Cunnington approached very close to the violation of the rule of impartiality which the Society has hitherto prided itself upon maintaining.

A Coal Output Report.

With so much pressure for this issue on the restricted number of "JOURNAL" pages available, it is necessary to hold over until next week publication of the comparative figures usually abstracted from Part III. (Output) of the Home Office Annua Report on Mines and Quarries. In postponing a fuller notice of the statistics, it will be admitted that one more week will not make any very great difference, seeing that the figures, which were officially issued only five or six days ago, are already considerably belated—referring, as they do, to the year 1915. That is a long while to look back now; and many things have happened in the meantime. But these things, of course, have not been of a nature calculated to facilitate the preparation of Departmental Blue-Books. Though, therefore, the statistics on the present occasion are in a much more restricted form than was the custom in pre-war times, there is no reason for surprise in the fact that they make their appearance at a considerably later date than usual. Among the tables which are excluded from the present report are those relating to exports and imports; but these figures have hitherto been obtainable elsewhere, and have, as a matter of fact, been recorded from time to time in the "JOURNAL." Briefly, the total output of coal in the year 1915 was 253,206,081 tons, and the value £157,830,670—showing a decrease in the output of 12,458,312 tons, and an increase in the value of £25,233,817 on the figures for 1914, which were 265,664,393 tons and £132,596,853 respectively. The average price of coal at the pit's mouth was 12s. 5·6d. per ton in 1915, as compared with 9s. 11·79d. in the previous twelve months. After meeting the export and steamer requirements for the year now under notice, the amount of coal remaining for home consumption was 193,254,156 tons, or 4·193 tons per head of the population. Calculating from the year 1873 to the end of 1915, the total value of the coal raised has been £3,241,021,908, and the quantity 8,459,449,000 tons. Of this amount, something more than 24½ p.c. has been shipped abroad as exports in the form of coal, coke, and manufactured fuel, and as coal used for steamers engaged in foreign trade.

OBITUARY.

We much regret to learn that the death occurred suddenly on the 11th inst. of Dr. E. J. CONSTAM, Professor at the Zürich Polytechnic, and Head of the Swiss Federal Fuel-Testing Laboratory, which he founded about twelve years ago at the request of the Swiss Government. Researches of a fundamental character on the valuation of different coals and oils for gas-making and fuel purposes, which he carried out independently or in conjunction with Dr. Schläpfer and other collaborators, have been reported from time to time in the "JOURNAL." He was personally well known to many English gas men through his frequent visits to this country, and his readiness to assist, even at great sacrifice of time and trouble, those who attended as delegates the international congresses held at Zürich. Though, we believe, an American by birth, he had made Switzerland his country and Zürich his home for over thirty years. His death, while still in possession of full capacity for work, will be a great loss to all concerned with the examination and use of fuel. The funeral (cremation) was fixed for the 14th inst.

"Do Fire-Clays contain Halloysite or Clayite?" is the title of a paper which Dr. J. W. Mellor is to read before the Ceramic Society on the 10th prox.

Fig. 1.—ERECTING SHOP FOR "LIP-AXIS" TILTING FURNACES.

Fig. 12.—AN INSTALLATION OF "LIP-AXIS" TILTING FURNACES.

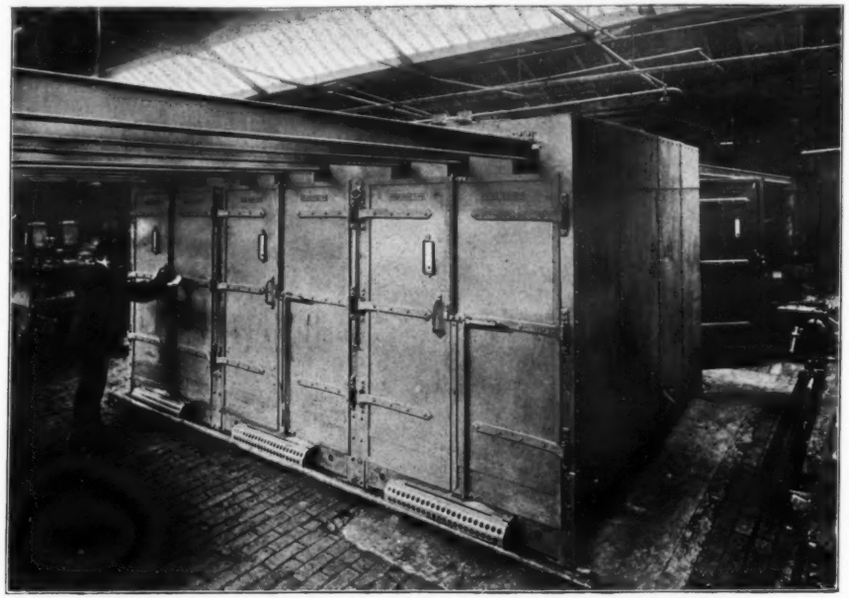


Fig. 9.—FIFTEEN-INCH SHELL DRYING OVEN IN COURSE OF ERECTION.

Fig. 10.—CRUCIBLE FURNACE ERECTING SHOP.

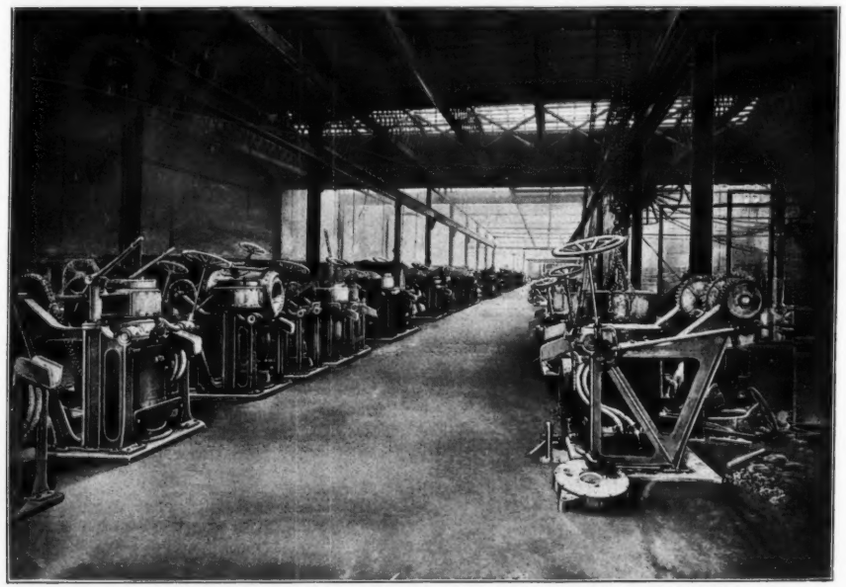


Fig. 1.—ERECTING SHOP FOR "LIP-AXIS" TILTING FURNACES.

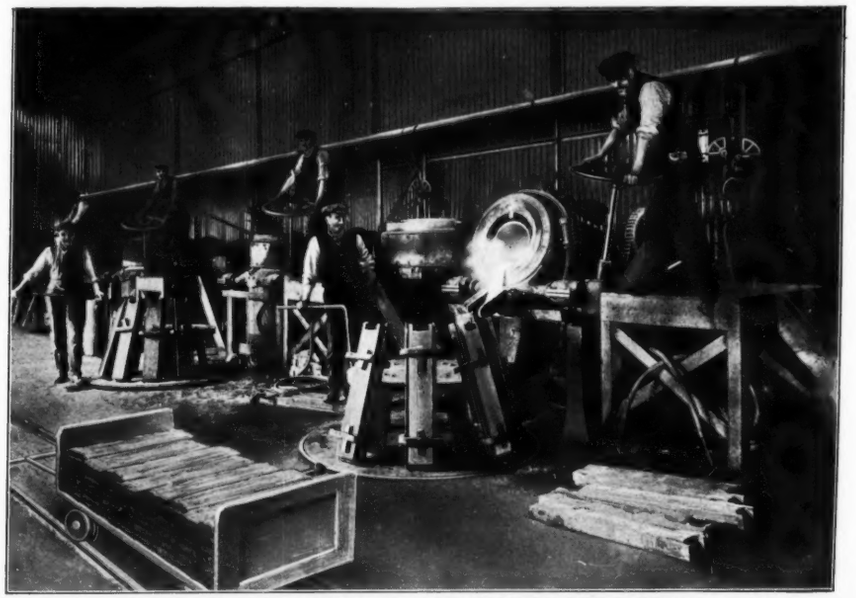


Fig. 12.—AN INSTALLATION OF "LIP-AXIS" TILTING FURNACES.

ORGANIZATION AND MEETING THE NEEDS OF THE WAR—At the Combined Works of John Wright & Co.

Fig. 1.—ONE OF THE FURNACE PATTERN SHOPS.

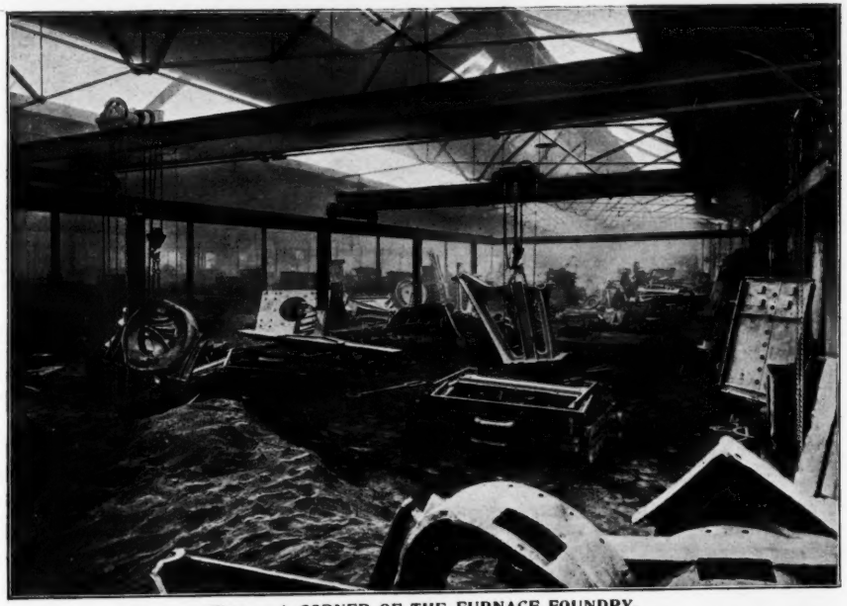


Fig. 2.—A CORNER OF THE FURNACE FOUNDRY.

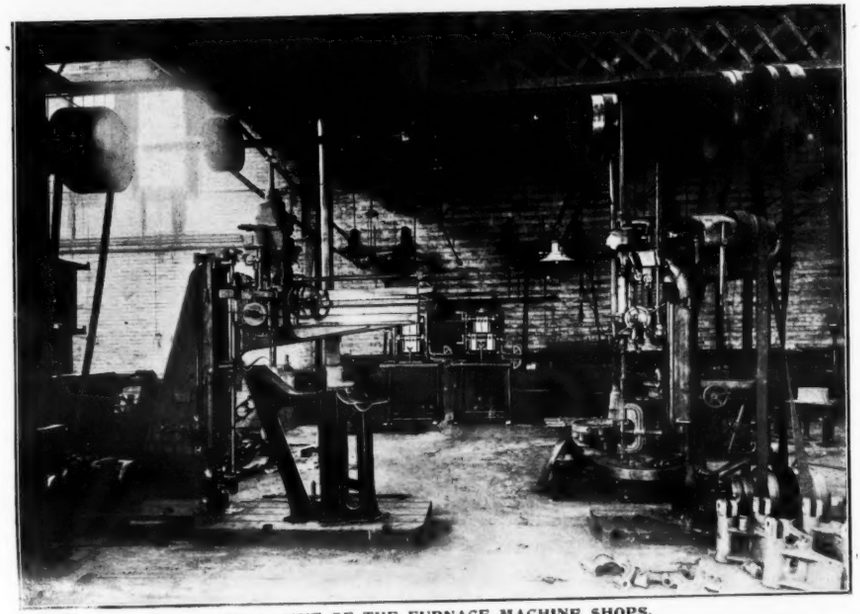


Fig. 3.—ONE OF THE FURNACE MACHINE SHOPS.

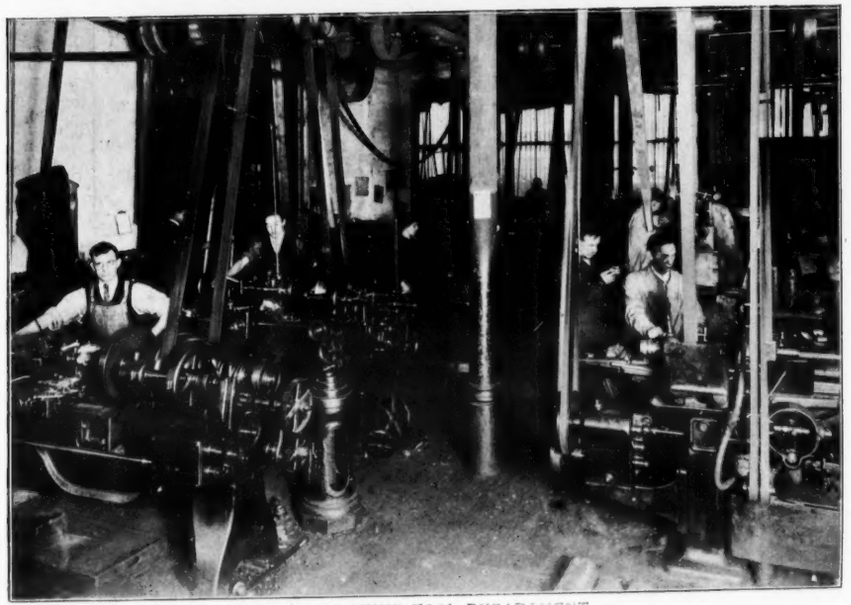


Fig. 4.—MACHINE TOOL DEPARTMENT.

Fig. 3.—ONE OF THE FURNACE MACHINE SHOPS.

Fig. 4.—MACHINE TOOL DEPARTMENT.

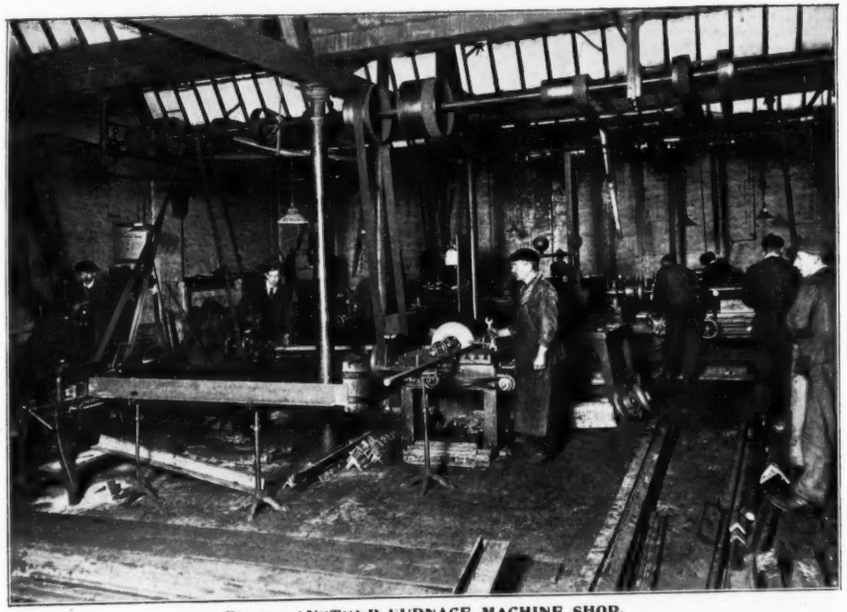


Fig. 5.—ANOTHER FURNACE MACHINE SHOP.

Fig. 6.—ERECTING SHOP FOR OVEN-FURNACES.

Fig. 7.—ERECTING SHOP FOR SPECIAL FURNACES.

Fig. 8.—NOSING-IN DEPARTMENT IN A SHELL FACTORY.

[See Over.

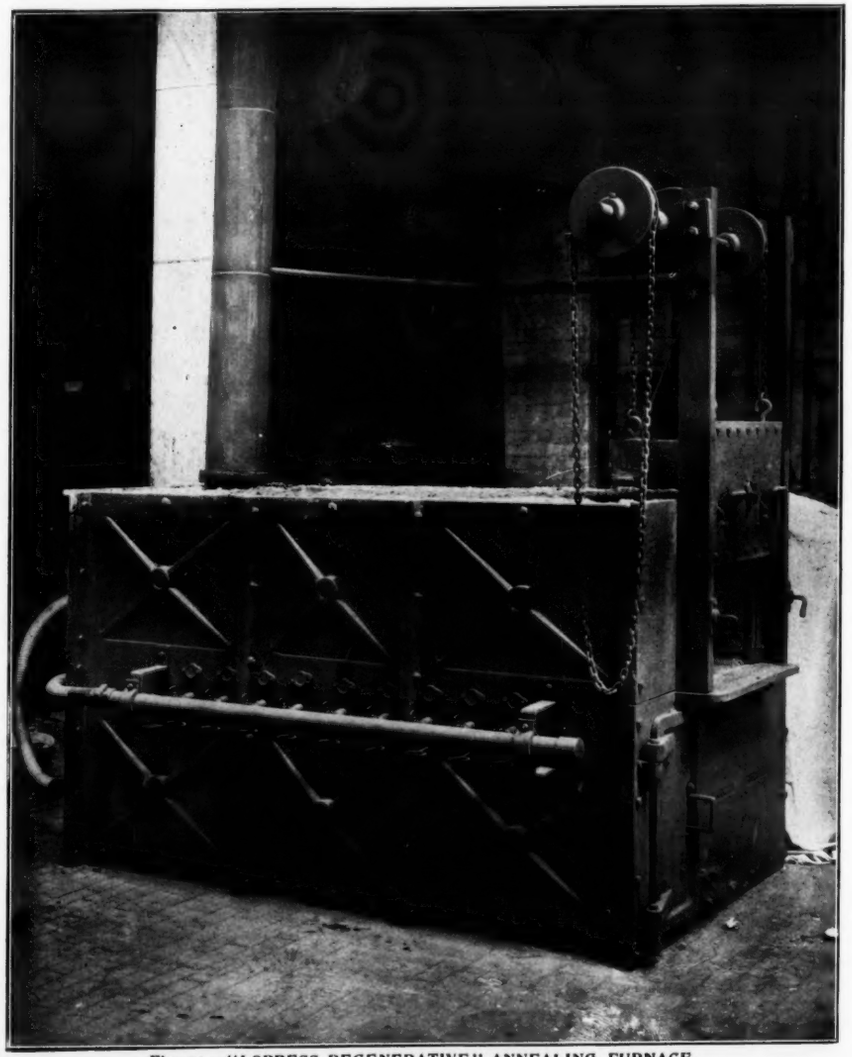


Fig. 13.—"LOPRESS-REGENERATIVE" ANNEALING FURNACE.

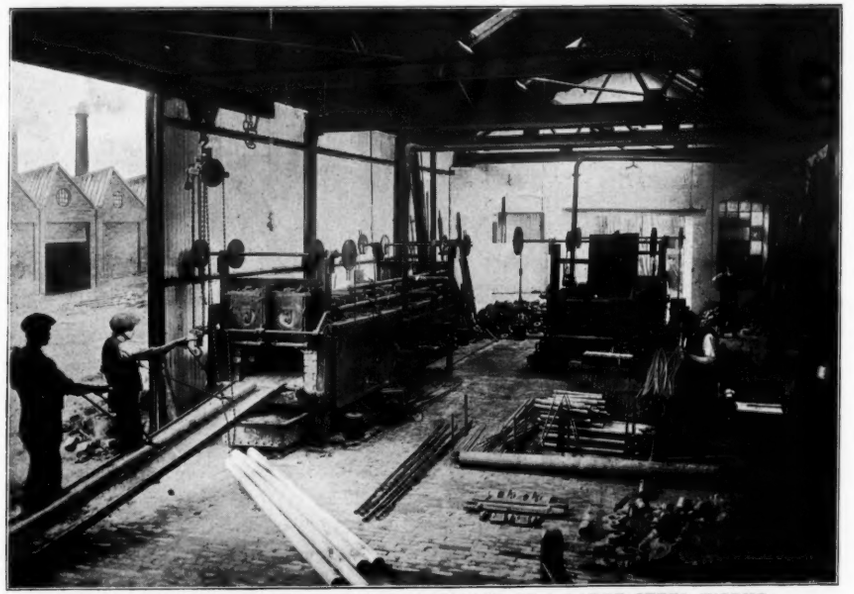


Fig. 14.—ANNEALING OVEN FURNACE INSTALLED IN A LARGE STEEL WORKS.

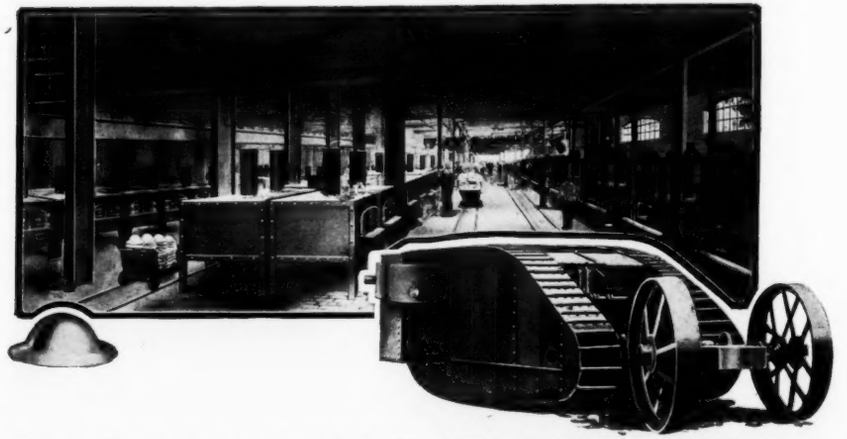


Fig. 15.—INSTALLATION OF GAS FURNACES IN A WORKS MAKING STEEL HELMETS AND "TANK" PLATES.

ORGANIZATION AND MEETING THE NEEDS OF THE WAR—At the Combined Works of John Wright & Co.

Illustrations to Accompany the Article on this Subject in the Current Issue of the "Journal."

PERSONAL.

Mr. H. L. JOHNSON, of the Midland Coal and Cannel Company, has accepted the post of Assistant Chief Commissioner (unpaid) to the Church Army on the Western Front, and leaves for France immediately.

Sub.-Lieut. W. J. LIBERTY, R.N.V.R., who was invalided from the North for an operation, is making good progress, and will shortly be leaving hospital for home. After a brief period of convalescence, he hopes to resume his naval duties.

At a meeting of the Directors of the Pinner Gas Company, Limited, on the 21st inst., Mr. FRANK H. JONES, M.Inst.C.E., of Palace Chambers, Westminster, S.W., was unanimously elected Chairman, in the place of the late Mr. A. W. Marshall.

Mr. J. S. INESON was at last week's annual meeting unanimously elected a Director of the Ventnor Gas and Water Company, of which he has been Secretary and Manager for the past thirty-two years. A high tribute was paid to him by the Chairman, Directors, and shareholders for the valuable services he has rendered to the undertaking.

Applications are invited by advertisement in this issue for the position of Secretary to the Bristol Gas Company, from which Mr. JOHN PHILLIPS has retired, we are sorry to learn, under medical advice. He will, however, retain his directorship of the Company, who may in this way hope to enjoy for a long time to come the benefit of the experience gained by him during his period of no less than 57 years' of service with the undertaking. After having been with the Company for upwards of thirty years, he was appointed Secretary, in succession to Mr. J. V. Green, early in 1892; so that he has held this position for a quarter-of-a-century.

In the course of the Directors' report being submitted at to-day's meeting of shareholders of the South Shields Gas Company these paragraphs appear regarding the two principal offices: Mr. J. H. PENNEY, the Secretary, who had completed over fifty-one years' faithful service with the Company (including over forty years as Secretary), has resigned, owing to ill-health; and the Directors recommend that a suitable life-pension be granted to him. Mr. A. PICKERING (Chief Assistant in the Secretarial Department) was appointed Secretary, *pro tem.*; and the Directors recommend that he be appointed Secretary as from Jan. 1. Mr. T. H. DUXBURY, who has been Engineer and Manager of the Company during the past sixteen years, is now designated Engineer and General Manager.

The successor next month of the Right Hon. H. E. Duke, K.C., M.P., in the presidency of the Society of British Gas Industries is to be Sir ROBERT A. HADFIELD, K.T., F.R.S., D.Sc., who is closely associated with the chief engineering and scientific societies in this country; and, in addition to the leading position which he holds as head of the great steel and armament firm of Hadfields Limited, he is a Director of the Sheffield Gas Company. His activities during the war have been extensive, he being a member of the Munitions Inventions Board and the Admiralty Committee of Board of Invention and Research. The Society is to be congratulated on his acceptance of the presidency, which further enhances its prestige, and is, incidentally, a recognition of the important status of the gas industry.

At a meeting of the Directors of the Tunbridge Wells Gas Company last Wednesday, six candidates from among nearly eighty were interviewed for the appointment of Engineer to the Company, and Mr. LEONARD J. LANGFORD, the Chief Gas Engineer to the Stoke-on-Trent Corporation, was the successful candidate. As previously stated, the position has been held by Mr. Andrew Dougall for 36 years, and he is retiring on account of his health. Mr. Langford is a son of Mr. W. Langford, the late Chief Engineer and Manager to the Stoke Corporation, who died two years ago. He was born and educated at Bath, and received his technical training in gas engineering at the gas-works there, under Mr. C. Stafford Ellery. In 1902 he was appointed Assistant to his father, who was then Engineer and Manager of the Longton Corporation Gas and Electricity Works, and was actively associated with him in effecting extensions and improving the general results. Six years later—in 1908—Mr. Leonard Langford was (out of over seventy applicants) appointed Engineer of the gas-works of the Abertillery Urban District Council. While he was there the output of gas was doubled, and the price reduced 6d. and 7d. per 1000 c.ft. to ordinary and slot consumers respectively. The works were also entirely remodelled and extended. In June, 1915, he was appointed from among forty applicants to his present position, having under his control works at Burslem, Longton, Fenton, and Stoke, with an aggregate output of 700,000,000 c.ft.

Coke-Oven Plant at Youngstown (Ohio).—A plant consisting of four batteries of Koppers coke-ovens has recently been started by the Youngstown (Ohio) Sheet and Tube Company. Each battery is made up of 51 12¼-ton ovens, and is intended to supply the coke required for the working of one blast-furnace. The surplus gas from these batteries is piped to the Company's adjoining steel plant, and used as fuel. In connection with the coke plant, there is installed a Semet-Solvay installation, which recovers benzol, toluol, and solvent naphtha from the gas after it leaves the direct-process tar and ammonia recovery apparatus.

RESTRICTIONS ON GAS CONSUMPTION IN GERMANY.

THE "Journal für Gasbeleuchtung" of the 6th ult. reproduced the decree of the German Federal Council, dated Dec. 11, ordering measures for the economy of fuel and illuminants. The chief of these measures which have been quoted in some of the daily papers, relate to the abolition of artificial lighting for any advertising or show purpose; the closing of shops at 7 o'clock, or on Saturdays at 8, and of restaurants, cafes, theatres, picture-palaces, &c., at 10 o'clock; the restriction of the lighting of shop windows and interiors, and the interiors of restaurants, theatres, &c., to a minimum, and of public lighting to the least consistent with public safety; and the cessation of the lighting of staircases of blocks of flats and tenement houses at 9 o'clock each night. Some of these restrictions came into force on Dec. 15, and the remainder on Jan. 1.

Gas-works are required to assist in these measures for economy in the consumption of coal by stretching their make to the greatest possible extent—*i.e.*, by increasing the yield of gas at the expense of its calorific power. Gas is no longer required to be above the former standard of 5000 calories per c.m. (=524 B.Th.U. per c.ft.), but may be reduced in value as far as is compatible with the proper functioning of lighting and heating burners, which, moreover, may be adjusted to suit the lower grade of gas. The Frankfort Gas Company have issued a circular and newspaper advertisements giving consumers directions, with illustrations of examples, how to make the necessary adjustments of burners, as fitters are not available to carry them out for the public.

The scarcity of coal is said to be due chiefly to insufficiency of railway wagons for its transport. Herr Kordt, the Manager of the Düsseldorf Gas, Water, and Electricity Works, explained to the German Gas Association's Committee on the Management of Gas-Works the steps which had been taken at Düsseldorf to cope with the situation which the shortage of coal had brought about. Since the beginning of the war, only those public lamps which were ordinarily kept alight throughout the night had been in use; those which were extinguished in the late evening hours, numbering more than half of the total, being thrown out of use altogether. The debenzolized gas supplied had a calorific power of only 508 B.Th.U. compared with a normal value of 545 B.Th.U. per c.ft. About four weeks previously, however, as much as 16 p.ct. of simple water gas had been added to the debenzolized coal gas, reducing the calorific power to 482 to 493 B.Th.U., and on one occasion even to 476 B.Th.U. per c.ft. Notices had been inserted in the chief local newspaper stating that, owing to the shortage of railway wagons, the coal stocks at the gas-works were extremely low, and it had been necessary to supply attenuated gas, which had led to frequent complaints of the lighting-back of burners, including boiling rings. This trouble could be overcome by the simple procedure of diminishing the air supply to the burners. Since, however, the burners of cookers generally had no air adjustment, many people still displayed anger at the supply; and to written complaints the gas undertaking ended its reply with a stereotyped statement that, while it greatly regretted the trouble which scarcity of coal had caused, it considered that it was better to supply bad gas than no gas at all.

At Düsseldorf, 5161 supplies had been given without meters (owing to the difficulty of obtaining the latter since the outbreak of war); a fixed charge per month being made for the service thus provided. About 4000 of these supplies included the use of a cooker; the charge in this case being about 4s. 2d. a month. The system apparently having led to much gas being squandered, a meter was secretly attached to one of these supplies; and it was found that the consumption in September was 4767 c.ft. and in October 5297 c.ft. It was consequently decided to cease to supply cookers on this system as from Dec. 1 last.

At Crefeld, it has been found necessary, in order to curtail the consumption, to charge for all gas consumed in any month since October last in excess of the October consumption, at the rate of 17s. per 1000 c.ft. At Benrath, a similar scheme was adopted on Dec. 1 last, the charge of 17s. per 1000 c.ft. being made for all gas consumed in a month in excess of the previous September's consumption. Other towns are expected to follow a somewhat similar plan in order to check consumption during the prevailing shortage of coal.

According to a later issue of our German contemporary, the Corporation gas-works of Ludwigshafen—the town on the opposite bank of the Rhine to Mannheim, best known abroad as the seat of the colossal Baden Aniline and Soda Works, where enormous quantities of synthetic nitrate are now being produced—ceased operations during the night of Jan. 3. The interruption is attributed to the exceptionally high consumption of gas synchronizing with a lack both of coal and trained hands. Hope was expressed that the works would shortly be able to resume the supply of gas.

Fuels for Metal Melting.—At the forthcoming spring meeting of the Institute of Metals (whose President is Sir George Beilby, LL.D., F.R.S., the head of the new Government Board of Fuel Research) there will be a general discussion on metal melting. A series of six communications will be made bearing on all phases of the question of the melting of the non-ferrous metals, whether by high-pressure or low-pressure gas, coke, oil fuel, or electricity.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED DEC. 31, 1916.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

——	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.*
							(Year's figures)
Gas sold . . . . . thousands	13,083,677	6,281,786	1,746,714	1,251,818	1,090,802	1,131,334	4,289,549
Increase . . . . . per cent.	1·38	1·02	4·13	3·91	6·13	Dec. 3·41	3·10
Gas made per ton of coal . . . . cubic feet	12,644	12,240	14,010	13,051	12,524	12,475	12,021
„ „ per gallon of oil . . . „	511	..	606	441	579	468	511
Gas unaccounted for . . . . . per cent.	7·57	6·82	9·56	7·14	10·27	11·66	7·10
Coke made for sale per ton of coal . cwt.	9·94	10·22	11·21	11·10	9·39	8 43	10·26
Tar made per ton of coal . . . galls.	9·75	9·63	10·53	8·80	..	..	11·29
Liquor made per ton of coal. . . galls, 8 oz.	34·91	39·10	37·15	30·51	37·79	..	36·99
Percentage of coke used as fuel	19·57	18·26	13·74	11·19	24·91	31·80	10·26
Capital expended per 1000 cubic feet sold during the past year	s. d. 10 11·07	s. d. 8 6·95	s. d. 8 5·13	s. d. 7 9·10	s. d. 9 5·45	s. d. 8 10·57	s. d. 7 0·54
Price charged per 1000 cubic feet	3/0 and 2/8	2/8	2/8	2/0 to 3/0	2/10 to 4/7	2/8 and 3/4	2/6 to 3/6
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	25·75	27·20	23·71	25·93	24·55	26·41	22·16
Less residuals—Coke and breeze	9·60	13·48	8·59	11·76	9·46	6·83	6·73
Tar	3·27	3·52	1·31	1·92	1·44	0·92	1·24
Amm. liq. and sulph. amm.	2·55	3·51	2·31	1·99	2·59	0·96	1·07
Total residuals . .	15·42	20·51	12·21	15·67	13·49	8·71	9·04
Net for coals, oil, &c.	10·33	6·69	11·50	10·26	11·06	17·70	13·12
MANUFACTURE—							
Salaries	0·30	0·89	0·43	0·41	0·60	0·32	0·45
Wages—carbonizing	2·23	1·97	1·75	2·05	1·40	2·55	1·56
Purification	0·27	0·43	0·18	0·29	0·39	0·36	0 21
Repairs—plant	5·86	4·87	4·72	3·91	4·61	3·42	3·12
Net manufacture .	18·99	14·85	18·58	16·92	18·06	24·35	18·46
DISTRIBUTION—							
Wages and salaries	1·25	0·94	0·90	1·29	1·60	0·92	0·96
Repairs—Mains and services, &c. . . .	2·00	1·43	0·89	1·52	1·85	1·32	1·23
„ Meters and prep. meters and fittings	1·87	1·72	1·93	0·87	1·87	1·51	0 98
„ Stoves—ordinary and prepayment .	1·95	1·28	1·62	1·40	3·06	1·14	1·58
Total net manufacture and distribution .	26·06	20·22	23·92	22·00	26·44	29·24	23·21
Public lamps—lighting and repairing	0·47	0·59	0·41	0·45	0·49	0·17	0 34
Rents, rates, and taxes	3·37	1·78	1·74	0·99	2·45	1·31*f*	1·84
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	0·24	0·28	0·33	0·57	0·82	0·49	0·42
Collectors.	0·59	0·67	0·83	0·50	0·56	0·47	0·53
Stationery and general charges	0·30	0·82	0·65	0·44	0·42	0·55	0·31
Profit-sharing	0·09	0·53	0·33	0·44	0·24	0·21	..
Bad debts	0·11	0·05	0·04	0·06	0·03	0·02	0 05
Law and parliamentary charges	0·02	0·03	0·01	0·09	0·00	0·01	0·00
Superannuations, &c.	0·49	0·66	0·35	0·36	0·54	0·39	0·50
National Insurance	0·08	0·11	0·08	0·07	0·07	0·05	0 06
Active service allowances and war bonus . . .	0·15*a*	2·48	0·40*a*	2·29	1·99	1·47	1·53
Sundries	0·03	0·05	0·02	0·02	..	..	0·00
Total expenditure (*less* residuals) . .	32·00	28·27	29·11	28·28*d*	34·05	34·38	28·79
GAS	35·12	31·16	30·65	27·90	37·39	31·76	30·06
Rentals—Meters and prep. meters and fittings	3·17	3·32	2·95	2·98	2·33	2·08	4·10
Stove	1·56	1·53	1·93	2·64	2·01	4·29	1·17
Incand. mantle maintenance . .	..	..	0·10	0·12	..	0·05	..
Miscellaneous	0·12	0·06	0·00	0·07	0·09	0·06	0·01
Total—Gas, rentals, &c.	39·97	36·07	35·63	33·71	41·82	38·24	35·34
Balance, being profit	7·97	7·80	6·52	5·43	7·77	3·86	6·55
Dividend and interest	10·24	7·53	8·17	7·06	7·57	4·60	5·92
Surplus or deficit	Def. 2·27	0·27	Def. 1·65	Def. 1·63	0·20	Def. 0·74*g*	0·63
Contributions to funds and sundry payments .	0 09*b*	0·73*c*	..	0·26*e*	..	0·76*h*	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	26 3·89	25 5·63	26 0·69	26 10·65	..	25 10 28	..
Coke realized per ton of coal	11 1·31	12 6·73	12 0·89	12 1·77	10 10·50	9 6·34	9 10·88
Coke „ „ of coke	22 4·21	24 7·03	21 6·41	21 10·61	23 2·06	22 7·33	19 3·66
Breeze „ per ton	5 3·02	1 11·76	4 0·80	5 0·14	2 4 86	1 10·15	6 8·92
Tar realized per gallon	0 4·91	0 4·11	0 1·96	0 2·46	0 1·86	0 1·49	0 1 68
Amm. liquor, &c., realized per butt (8 oz.) . .	9 7·64	9 0·87	9 8·19	7 8·85	8 6·48	..	4 9 66
Percentage of stoves at rental to consumers .	85	99	75	95	106	72	100
Bad debts per cent. on total receipts	0·19	0·09	0·09	0·12	0·05	0·3	0·12
Net profit per cent. on ordinary capital . . .	2·68	4·88	3·70	4·36	5·00	2·16*i*	5·09
One penny variation equals in half year . . .	£54,515	£26,174	£7278	£5216	£4545	£4714	£16,338
Carburetted water gas, per cent. on total make .	21·34	..	27·98	9·66	19·58	36·45	39·58

a Active Service Allowances only.
b Redemption Fund.
c Insurance Fund.
d Capital Duty eliminated.
e Capital Duty.
f Rent and Rates only.
g By eliminating War Payments a surplus is shown of 0·81d.
h Income-Tax.
i Including Electricity Results.

* The Brentford Company's figures are based on a full year's accounts.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1916.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

——	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Gas sold . . . . . thousands	177,920	63,365	69,331	47,081	63,032	**39,955**	(Year's figures.) 486,379
Increase (variation equal to) . . . per cent.	**0·2**	3·05	2·65	3·39	5·12	**8·30**	·09
Gas made per ton of coal . . . . cubic feet	**147**	**38**	54	544	**68**	24	**146**
,, ,, per gallon of oil. . . . ,,	108	..	157	43	152	63	53
,, unaccounted for . . . . . per cent.	1·99	**·10**	·16	·84	·60	**·09**	1 27
Coke made for sale per ton of coal . cwt.	**·02**	·84	·05	..	**·78**	**·89**	**·23**
Tar made per ton of coal . . . . galls.	**·14**	**·04**	**·83**	**·52**	..	..	**1·06**
Liquor made per ton of coal . . . galls, 8 oz.	**2·57**	**1·67**	·88	**4·69**	·45	..	2·56
Percentage of coke used as fuel	**·13**	**5·76**	3·00	·03	**2·19**	7·33	**5·39**
Capital expended per 1000 cubic feet sold during the past year	s. d. **0 1·05**	s. d. 0 1·14	s. d. **0 1·26**	s. d. **0 0·14**	s. d. **0 4·85**	s. d. 0 2·52	s. d. **0 1·82**
Price charged per 1000 cubic feet†	..	**0 2·00**	..	**0 1 00**	..	0 5·00	0 2·00
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	5·99	2·25	6·30	6·41	·07	7·19	4·56
Less residuals—Coke and breeze	2·22	2·86	1·93	2·66	**·13**	1·22	1·68
Tar	1·73	·99	**·17**	·50	**·10**	·21	**·02**
Amm. liq. and sulph. amm.	·31	1·33	·41	**·21**	·20	**·28**	·04
Total residuals . .	4·26	5·18	2·17	2·95	**·03**	1·15	1·70
Net for coals, oil, &c	1·73	**2·93**	4·13	3·46	·10	6·04	2·86
MANUFACTURE—							
Salaries	·00	·15	**·01**	·10	**·02**	·02	**·04**
Wages—carbonizing	·33	**·04**	·09	·07	·09	·92	·07
Purification	·05	**·05**	·03	·16	·17	·05	**·04**
Repairs—plant	·99	1·03	·33	**1·01**	·93	**·58**	**·33**
Net manufacture . .	3·10	**1·84**	4·57	2·78	1·27	6·45	2·52
DISTRIBUTION—							
Wages and salaries	·07	·05	·05	·01	**·04**	·00	**·06**
Repairs—Mains and services, &c. . . .	·21	**·03**	**·58**	**1·52**	**·42**	**1·31**	**·13**
,, Meters and prep. meters and fittings	**·11**	**·72**	**·12**	·04	**1·46**	**·19**	·01
,, Stoves—ordinary and prepayment .	**·04**	**·05**	**·05**	**·19**	·12	**·15**	**·05**
Total net manufacture and distribution	3·23	**2·59**	3·87	1·12	**·53**	4·80	2·29
Public lamps—lighting and repairing	**·07**	·00	·02	**·05**	**·32**	**·19**	**·06**
Rents, rates, and taxes	·03	**·50**	**·61**	**·05**	·66	**·93**	**·11**
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	**·03**	·02	·00	**·01**	**·04**	·01	**·01**
Collectors	·05	**·01**	·04	·00	**·03**	·00	·02
Stationery and general charges	**·01**	·17	·07	·00	**·10**	·06	·01
Profit-sharing	·00	·26	**·01**	·02	·01	**·20**	..
Bad debts	**·03**	**·04**	**·01**	**·01**	**·06**	**·01**	**·04**
Law and parliamentary charges	·01	**·05**	**·01**	·05	**·07**	**·03**	**·06**
Superannuations, &c.	**·02**	·01	**·01**	**·05**	**·04**	·05	·00
National Insurance	·00	·02	·01	**·01**	**·01**	·00	·00
Active Service allowances and war bonus . .	·02	1·26	·05	·72	·90	·32	·52
Sundries	**·01**	·02	**·01**	·01	..	..	·00
Total expenditure (*less* residuals) . .	3·17	**1·43**	3·40	1·74	·37	3·88	2·56
GAS	**·19**	**2·07**	**·50**	**1·03**	**·03**	4·27	1·70
Rentals—Meters and prep. meters and fittings	**·01**	**·02**	**·04**	·00	**·05**	·09	·00
Stove	·09	·04	·05	·10	·03	·04	·01
Incand. mantle maintenance . . .	..	..	·00	**·02**	..	**·06**	..
Miscellaneous	·01	·00	·00	·00	**·01**	·00	·00
Total—Gas, rentals, &c.	**·10**	**2·05**	**·49**	**·95**	**·06**	4·34	1·71
Balance, being profit	**3·27**	**·62**	**3·89**	**2·69**	**·43**	**·46**	**·85**
Dividend and interest	·08	·23	**·30**	·00	**·34**	**1·06**	**1·26**
Surplus	**3·35**	**·85**	**3·59**	**2·69**	**·09**	1·50	**·41**
Contributions to funds and sundry payments .	**·65**	·34	..	**·11**	..	**·46**	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	4 11·04	2 0·81	6 4·00	7 3·88	..	4 10·70	..
Coke realized per ton of coal	2 2·46	2 10·60	2 3·74	2 1·30	**0 6·19**	1 1·52	1 10·92
Coke ,, ,, of coke	4 5·62	3 11·43	4 0·43	3 9·64	0 9·18	4 7·00	4 0·68
Breeze ,, per ton	0 3·76	**2 3·01**	0 2·49	3 0·16	**2 7·56**	1 1·53	1 7·44
Tar realized per gallon	0 2·49	0 1·17	**0 0·07**	0 0·55	**0 0·25**	0 0·04	0 0·00
Amm. liquor, &c., realized per butt, 8 oz. . .	1 3·28	3 7·94	1 1·66	0 1·11	0 2·51	..	**0 4·78**
Percentage of stoves at rental to consumers .	3	0	3	3	6	2	3
Bad debts per cent. on total receipts	**·09**	**·08**	**·03**	**·03**	**·11**	**·05**	**·11**
Net profit per cent. on ordinary capital . . .	**2·14**	**·40**	**2·46**	**2·62**	**·06**	**·26**	**·67**
One penny variation equals in half year . . .	£741	£264	£289	£196	£263	**£166**	£492
Carburetted water gas per cent. on total make .	**2·13**	..	**3·25**	**5·74**	**2·39**	**3·66**	**2·19**

† These figures show the variation in price in the Companies' principal areas.

LIGHTING POWER AND VARYING CALORIFIC VALUES.

FOLLOWING up the letter published last week correcting two or three points in the evidence of Mr. E. S. D. Moore, the technical expert in the Lighting Department of the London and North-Western Railway, at the Board of Trade inquiry into the application of the South Suburban Gas Company under the Gas (Standard of Calorific Power) Act, we have received from the same source the appended information, which is intended to show how the lowering of calorific power affects the lighting efficiency of incandescent burners. The figures are dealt with in our editorial columns, and here the information stands as submitted. The document reads:

The following figures, which have been tabulated from the results of numerous tests carried out with all grades of town gas, show the approximate increased or decreased consumption required to maintain the same candle power with gas of different calorific values. Four burners are dealt with, which represent the sizes in general use, the standard candle powers of which are 30, 50, 60, and 100.

Calorific Value.	One Light. No. 1 Burner. 30 c.p.	One Light. No. 2 Burner. 50 c.p.	Two Lights. No. 1 Burner. 60 c.p.	Two Lights. No. 2 Burner. 100 c.p.
	C.Ft.	C.Ft.	C.Ft.	C.Ft.
440—450	1·78	2·64	3·21	4·88
470—480	1·59	2·42	2·97	4·42
480—490	1·53	2·35	2·88	4·28
490—500	1·49	2·28	2·79	4·15
500—510	1·47	2 22	2·72	4·10
510—520	1·44	2·14	2·64	4·02

Comparing the figures of the 500–510 and 470–480 ranges, it will be seen that increased consumption, amounting, on the average, to approximately 8 p.ct., is required in order to maintain the same candle powers. On the assumption that the same number of B.Th.U. per hour or minute are required to maintain the same candle power with different calorific values, the increased consumption would be 5·3 p.ct. It is found in practice, however, that the operating efficiency of burners is also reduced by depreciation of calorific value. The following figures, calculated from the table above, show this:

Calorific Value.	One Light. No. 1 Burner. 30 c.p.	One Light. No. 2 Burner. 50 c.p.	Two Lights. No. 1 Burner. 60 c.p.	Two Lights. No. 2 Burner. 100 c.p.
	C.P. per C.F.	C.P. per C.F.	C.P. per C.F.	C.P. per C.F.
440—450	16·9	18·9	18·7	20·5
470—480	18·9	20 7	20·2	22·6. Av. 20·6
480—490	19 6	21·3	20 8	23·4
490—500	20·1	21·9	21·5	24·1
500—510	20·4	22 5	22·1	24·4. Av. 22·4
510—520	20·8	23 4	22 7	24·9. A loss of 8 p ct.

THE GAS INDUSTRY AND WAR FINANCE.

GRATIFICATION is general at the amount of "new money," provisionally stated last week as "at least £700,000,000," subscribed to the new War Loan. This is a much larger figure than was reached by previous loans, and also more than was expected by many people in the City well qualified to judge; but with the lessons of the past to learn from, who would venture to assert, should another loan become necessary, that in amount it would in any way fall short of this last one?

And it must be remembered, too, that, though the subscription lists for the loan are closed, contributions to the War Chest are still being made, of large extent, by other means. The attraction of the "£1 for 15s. 6d." War Savings Certificates is becoming more and more widely understood, with the result that their popularity is growing by leaps and bounds. Associations are springing up all over the country; and from their operations—in addition to the first and foremost object, of helping to win the war—lasting good may confidently be expected to arise, for habits of thrift will be acquired which in very many instances—their advantage being once proved—will never again be departed from.

A few more instances of what is being done in this direction in the industry may be quoted here. The Croydon Gas Company have given special facilities to their employees for investing in War Savings Certificates, and, by means of endowment assurance policies, in the War Loan. In this way, the men have already taken up about 3000 certificates, and £2000 in the War Loan. A Granton Gas-Works War Savings Association has been started; and the scheme is, it is said, being taken up enthusiastically by the employees. At the request of the men, the Ipswich Gas Company have taken £500 in War Savings Certificates, the whole of which have been allotted. Another recently started Association is that of Messrs. W. Sugg and Co., by whose employees upwards of 1200 of the certificates have already been applied for. The whole of the workers, both women and men, have invested under a scheme inaugurated by the Yorktown and Blackwater Gas Company—the Directors purchasing the War Savings Certificates, and the employees repaying the amount by weekly instalments, according to the number applied for by them.

SECOND LIST OF SUBSCRIPTIONS TO THE WAR LOAN.

The sums mentioned in the following list are in some instances all "new money," while in others they include conversions of previous holdings.

Barnet Gas and Water Company	£10,000
Bournemouth Gas and Water Company	34,257
British Gaslight Company	27,000
Gas Accumulator Company (United Kingdom)	10,000
Gas Workers and General Labourers' Union	50,000
Ipswich Gaslight Company	11,000
Matlock and District Gas Company	1,000
Normanton Gas Company	1,000
Radcliffe and Pilkington Gas Company	5,000
Royston (Yorks.) and District Gas Company	5,000
Salford Corporation Gas Department Employees	1,705
Smethwick Gas Department	10,500
South Suburban Gas Company (in addition to conversions)	50,000
Sugg, William, and Co.	10,000
" " " Staff	1,050
Weymouth Consumers' Gas Company	5,690
Yates, Mr. H. James (additional)	5,000
Yorktown and Blackwater Gas Company	1,000

ELECTRICITY SUPPLY MEMORANDA.

DURING the recent severe cold—with several degrees of frost making us individually uncomfortable, and playing sad havoc with the conveniences of daily life—great trouble was experienced by householders in obtaining supplies of solid fuel. The slender number of men available for distribution in proportion to the prodigious demand was the cause—the one did not fit the other, owing to the drastic "combing-out" of coal-heavers to serve the country in another capacity. The conditions then experienced accentuated the value of gas-mains as an economy-promoting means of distributing B.Th.U. No wear and tear of street surfaces, no wear and tear of vehicles, no wear and tear of horses, and no drivers with mates finding sweet repose on a soft couch composed of tar-smelling sacks, filled or otherwise with coal. The gas-main, if the universal provider of fuel, would sweep all such street impediments and nuisances away. This economic advance upon the ordinary crude lumbering methods of distributing coal was referred to in a paragraph in the "JOURNAL" a fortnight ago (p. 288). "Electrical Industries" was simultaneously beating about on the same track; for a day later there appeared in it a paragraph headed "Wagon or Wire," which title alone indicates the trend of what followed. The electricity generating station and the wire is a dreadfully wasteful route for the B.Th.U. of coal to take; but still, in the late low-temperature difficulty, it may be, as our contemporary bravely ventures to remark, that "people in possession of electric-fires were able to observe with comparative equanimity the struggles of their neighbours for a few pounds of coal." We are glad to see the conscientious use of the word "comparative." For the equanimity of the users of electric-fires (if the only available means of heating) was, during the austere conditions, anything but complete. There is acquaintance with a certain deluded household, the members of which were very envious of our gas-fires during that many-degreed frost. There succeeds in our contemporary grudging reference to gas-fires: "Users of gas-fires were, it may be admitted, better off than non-users." "It may be admitted!" There is a note of regret and of reluctant concession about the words.

Underground Conveyance of Heating Agents.

Gas "Quality" and Relative Thermal Values.

Then the writer allows an allegation to slip from him about which we should like to know more. "Bad pressure and bad quality," he says, "made the gas-fire a very feeble weapon against the intense cold of the last few weeks." Where did this occur? We have a gas-fire in every room at our City offices, and gas-fires are to be found at the homes of the staff in different parts of the Metropolitan area and the suburbs. Most of our friends, too, have gas-fires. In all these instances the gas-fire was an effective weapon against the intense cold. No complaints have been heard as to deficient pressure, excepting in the Tottenham Company's area, and that is due to the great demand for gas, and the impossibility of immediately obtaining additional pressure-raising appliances from the makers, owing to war work and official prohibitions until permits are secured. As to the "quality," that is a point about which additional information would be valuable from our learned confrère. There is one quality that is all-important, and that is calorific power. The work that is now being carried on by the gas industry for the Ministry of Munitions, and therefore for the

country—including the part of the population that is devoted to electricity supply—does not, to the extent of the practice by gas undertakings, affect the calorific value of the gas by more than (say) 5 p.ct. at the outside, and this with gas with a standard and penalty point attached of 500 B.Th.U. per cubic foot. What, then, does the electrical scribe mean by such an ignorant generalization as the "bad quality" of the gas making the gas-fire a feeble weapon? Coal is also maligned, in a glaringly inaccurate manner. It is said that, with coal at over £2 per ton, the electric "fire" became economical for much longer hour heating than was previously the case. This is unadulterated pretence. A ton of good house coal will produce on combustion about 33,600,000 B.Th.U. Assuming the efficiency of the coal grate to be as low as 20 p.ct., the ton of coal would put into a room 6,720,000 B.Th.U. The sum of £2 spent on electrical heat energy will produce 1,641,600 B.Th.U., at 1d. per kilowatt-hour, and 3,283,200 B.Th.U. at ½d. per kilowatt-hour. So that current would have to be sold at less than ¼d. per unit, and the electric heating appliances give 100 p.ct. efficiency, to equal coal at £2 per ton and coal grates with the low heating efficiency of 20 p.ct. Modern coal grates claim a greater efficiency than that. Our contemporary seems to have got lost among things as it wishes them to be, and has missed the things that matter, which are those that actually exist. "If," it adds, "the electrical industry had been able to run new services, there would have been a magnificent boom in electric heating." Not among the householders who have had experience of electric "heaters," when the outside temperature was several degrees below freezing-point.

Electric Heating and Luxuriant Costs.

It is interesting to turn from the electric heating generalizations of one electrical contemporary to information as to actual experiences as published by another. As was shown in the "Memoranda" lately, America is bent on proving that electric heating for domestic purposes is not economically feasible. Experiences (among other places) at Seattle furnish illustrations, from which readers were supplied with interesting material on Nov. 21 last. Mr. F. A. Osborn, Professor of Physics at the Washington University, has been investigating the question in his own house at Seattle, with current supplied at ½d. per unit. The house in the ordinary way is heated by a hot-air furnace, using coal at $7·75, or 32s. per ton; and the cost was $75 per annum (£16 10s.). Tests with coal heating were carried out from Dec. 1, 1915, till Jan. 19 of last year. During this period, Seattle experienced the coldest weather of the season; the average outside temperature being 38·2° Fahr. In the day-time the temperature indoors was maintained at about 66·1° Fahr., and at night at 59·9° Fahr. The total coal consumption was 4890 lbs. (2 t. 3 c. 74 lbs.), an average of 698 lbs. weekly. This, at $7·75 per ton, cost $18·95 (£3 19s.)—an average of $2·42 (9s. 2d.) per week. Tests with electric-heaters extended from Feb. 1 to March 14, 1916. During this period, the outside temperature averaged 41·5° Fahr.; the day and night temperatures indoors averaging 66·2° Fahr. and 57·6° Fahr. respectively. The power consumption for the six weeks was 4274 units—an average of 712·3 per week. At 1 c. per unit, the cost was $42·74 (£8 18s.)—an average of $7·12 (29s. 8d.) per week, or £1 0s. 6d. more per week! To this figure must be added the cost of heating (by gas) water used for domestic purposes, as this was ordinarily supplied from a water-coil heated by the hot-air furnace. Water heating by gas cost $2·50 (6s. 3d.). An allowance must also be made for the higher average external temperature during the electrical tests, for the furnace provided 12 p.ct. more heat during the coal test, in order to maintain the same average temperature indoors. Electric heating, to give the same results, would have involved, therefore, a power consumption of 4787 units. The cost for electric heating, under identical conditions with those prevailing when coal was used, would have been $50·37 (£10 10s.), or $8·39 (34s. 10d.) per week! Electric heating would thus cost 3·46 times as much as coal in the conditions prevailing at Seattle. To bring the cost equal, electricity would have to be sold at 0·29 c. (0·145d.) per unit, which the Professor wisely regards as impossible. These particulars are taken from the "Electrical Times."

Gross Artificiality.

In some of the literature treating of the capabilities (real and assumed) of electricity for domestic purposes, pretence predominates such as that incidentally remarked upon in a preceding paragraph. Now the "Electrician" mentions another form of pretence, which very properly does not meet with its approval. It states that efforts have often been made to simulate in the electrical grate the conditions present in a wood or coal fire. But to the intelligence of our contemporary it seems hopeless to attempt to imitate dancing flames by electrical means. That is a wise recognition. The only means by which the dancing flames can be secured electrically is by some combustible being brought into contact with a defective live wire; and there have been a good many instances of not only flames but property owners dancing as a result of defective wires and combustibles jointly agreeing upon mischief. However, in the United States attempts to imitate glowing logs seem to have been made; and the artificiality of the results is of the most pronounced order. We read that in the latest device the logs are made of a translucent material and asbestos, reinforced with metal, and made hollow for the insertion of electric-lamps. The bark and cut ends are hand painted to give the "natural appearance" of partially burned logs. Coal fires are imitated by the use of electric bulbs concealed in a mixture of selected pieces of coal and transparent lumps of glass. A "chemical smoke" is also suggested. When electricity is forced back upon such meretricious methods to make itself acceptable, it cannot hope for success. Even our contemporary feels a bit sick over such endeavours at silly deception. It says: "It is to be feared that a fire in which the conditions in this respect are stationary would never deceive for any length of time, however cleverly contrived. On the whole, the best plan would seem to be to recognize frankly that an electric heater is not a wood or coal fire, and should not be expected to resemble one." Fancy anyone sitting on a cold winter's night before an imitation log painted to represept a partially burnt log, and with translucent material trying to give a warm appearance by the aid of an enclosed electric bulb. The illusion might appeal to the eyes; but the body would rebel. Of all the foolish electrical notions we have come across, this one is about the worst. The authors of electrical impositions of this and other kinds ought to be carefully guarded; for they are the people who do more harm than good to the electricity supply industry.

Help!

The begging letter which the Hackney Borough Council sent out recently, intimating that contributions would be thankfully received towards the legal expenses they propose to incur in connection with the "undue preference" action brought against them by the Gas Light and Coke Company, seems to have fallen somewhat flat. A short time since we mentioned a few electricity concerns that had promised a little help in sharing the expenses of a contest; but since then other electricity purveyors have either ignored the appeal, or are not altogether proud of the size of their responses, and so have not allowed them to be published. Perhaps, too, some have been too much engrossed in looking after subscriptions to the 5 p.ct. War Loan to heed the solicitation of the Hackney Borough Council to assist in financially maintaining them in their quarrel with the Gas Light and Coke Company. After a long wait, another subscriber has been netted—the West Hartlepool Corporation, who have decided to send the Hackney Council £5! It is to be hoped the Hackney Council will be properly grateful. But it does seem a strange thing that the Hackney Council, having a desire to contest the question of undue preference in the matter of electricity charges, should have to beg for financial assistance to enable them to do so. We wonder under what heading of expenditure municipal corporations place contributions towards the support of such an action as this, and whether the Local Government Board Auditor will approve. The Barnes District Council are not going to take any risks; they are asking the Board to sanction a contribution of £20 towards the costs of Hackney. What will the Board say on the question of "maintenance?" It is understood that a second letter has been sent out from Hackney urging a favourable response. This tells a tale of disappointment.

Train Fires and Electricity.

As a little corrective for the "Lest we Forget" organ of the electrical industry, we reproduce the following paragraph from a daily newspaper: "An electric train from Waterloo to Shepperton caught fire yesterday just beyond Earlsfield Station. It was taken back to Earlsfield, where all the passengers alighted, and were later transferred to another train. The damaged coaches, in which the fire was soon extinguished, were subsequently removed from the line."

Northern Star Lodge.

The installation of W.Bro. John Bond, of Southport (W.M. of the Scarisbrick Lodge, No. 2295), as W.M. of the Northern Star Lodge, No. 3053, took place at Manchester last Friday, at the Midland Hotel; the Installing Master being W. Bro. E. J. Wellens, of Sheffield. The list of officers invested is given below, from which it will be noticed that W.Bro. R. G. Shadbolt has retired from the office of Secretary, which he has held since the founding of the Lodge in 1904; while Bro. E. O. Watson, of Rotherham, has also resigned his office as Assistant Secretary and Treasurer.

Bro.	John Bond (Southport)	W.M.
,,	E. J. Wellens (Sheffield)	I.P.M.
,,	John W. Morrison (Sheffield)	S.W.
,,	Joseph Taylor (Bolton)	J.W.
,,	F. E. Moss (Wigan)	Chaplain
,,	Walter Whatmough (Heywood)	Treasurer
,,	William Batt (Lytham)	Secretary
,,	J. W. Broadhead (Elland)	D.C.
,,	T. Ousey (Higher Broughton)	S.D.
,,	R. H. Garlick (Salford)	J.D.
,,	S. Meunier (Stockport)	Assistant D.C.
,,	S. Shadbolt (South Bank (S.O.)	Organist
,,	James M'Ewen (Manchester)	Assist. Secretary
,,	H. Butterworth (Blackley)	I.G.
,,	R. J. H. Sayers (Manchester)	Almoner
,,	A. J. Harrison (Padiham)	Stewards
,,	M. L. Williams (Stretford)	Stewards
,,	H. G. Harrison (Ashborne)	Stewards
,,	E. West (Alderley Edge)	Stewards
,,	P. D. Walmsley (Wombwell)	Stewards
,,	John W. Turner (Scunthorpe)	Stewards
,,	Charles Fairweather (Kilmarnock)	Stewards
,,	Fred. J. West (Manchester), Charity Representative.	

MODERN GAS-WORKS PRACTICE.*

THIS book, by Mr. Alwyne Meade, will prove of much use to members of the gas industry connected with the manufacturing side, and especially to the rising generation, who have hitherto had little or nothing suitable in the nature of a complete modern text-book to guide them in their studies. Mr. Meade has met the need. About this there is no doubt. That one man, and a busy one, too, should have found time to compile all the data and illustrations which comprise his substantial volume in so short a time (the author speaks of his work as having extended a few months over a year), and to serve it up in so up-to-date a manner, is a notable achievement. The author has not shirked the unenviable task involved in calculating masses of figures where these are necessary to make the subject-matter complete. The book is of considerable size, and contains upwards of 500 pages. It is of excellent appearance, printed in readable type, and generally has the air of good workmanship. The publishers, Messrs. John Allan & Co., are to be congratulated upon the general result. The whole subject of "Modern Gas-Works Practice" is divided into eighteen chapters, which strike one as being well arranged.

The author is known as the lecturer in "Gas Engineering" at both the Westminster Technical Institute and the Regent Street Polytechnic; and there is no doubt that the information required in conducting these classes, and therefore already collated, stood him in good stead in compiling the book. The volume opens with an appropriate introductory note from Mr. Stanley H. Jones, the author's chief, and the Engineer and General Manager of the Commercial Gas Company, who speaks of Mr. Meade's "characteristic thoroughness," which feature is well in evidence throughout the book.

To deal in brief detail with the contents. Chapter I., on the "Planning and Laying-out of Gas-Works," is full of useful information and figures to act as a guide to the cost of various parts of the plant. The next chapter treats of the "Foundations of Gas-Works Buildings, &c.," in which due regard is paid to the use of reinforced concrete. It is noticed that under "Retort-House Floors," the author does not include cast-iron plates, whereas in practice large and properly designed plates laid from joist to joist take a deal of beating, as they are not only almost everlasting, but portable—an advantage when engaged on summer repairs.

Chapter III. is entitled "The Horizontal Retort-Bench." Here the author speaks of the quantity of fuel burned in the modern retort-setting as having been reduced to "fine limits" by reason of the curtailment of thermal losses. Is this really so? It is true that the latest settings show a magnificent improvement on the old direct-fired settings; but the thermal losses are still far greater than they should be. We would also disagree with the remark of the author that "fuel figures for verticals are at present more or less in the nature of experiments." Surely, in this respect, there are now plenty of reliable data. Everything concerning verticals, as far as at present developed, should be known, except costs of repairs and renewals. In this chapter the illustrations are exceedingly good and clear; and, being drawn in perspective, a much better idea is given of structures which cannot be illustrated clearly in the usual manner. The author might in this chapter with advantage have described suitable means of heat insulation as applied to retort-settings, especially having regard to his statement as to thermal losses referred to above.

Very cursory attention is paid to inclines, which are dismissed with one-and-a-half pages and an illustration. This cannot be said to be adequate; for there are in various parts of the country well designed inclined retorts giving equally good results as the best types of horizontals. Under war conditions, the inclined retort, with the absence of machinery and the necessary fitters, machinists, and materials to cope with repairs to stoking and power plant, and with the small staff of men necessary to charge and draw the charges, has much to commend it, when compared with the machine-fed horizontal retort. Some additional consideration might well be given to this subject.

The author pays a good deal of attention to the control of horizontal retort-settings—a matter which has hitherto escaped notice in other text-books, though it has been well treated in the Technical Press. But in this case the absence of a comprehensive index makes it almost inaccessible. The suggestion might here be made that a well-arranged index of all gas technical papers and articles would be valuable, and equal to the best text-book that could be written. Perhaps this suggestion may catch the eye of some other energetic investigator of technical work and experiences.

Vertical retorts come in for a fair amount of consideration, but none too much, having regard to the fact that most engineers would have them if given the opportunity to extend or to start afresh. Chamber ovens are briefly described, as they should be; for there is little doubt that the future will see more of this type of plant in gas-works. The ideal state of affairs is more likely to be represented when we have continuous verticals supplying household gas coke, chamber ovens metallurgical coke, and horizontals (and inclines in spite of the author's poor opinion of their usefulness) the coke for ordinary industrial purposes.

In spite of Prof. Armstrong's advocacy of low-temperature carbonizing systems, the author has the courage to neglect all mention of this method—if method it can yet be called—of carbonizing. Like other people, Mr. Meade is waiting until some practical system is evolved before dilating on the merits or otherwise of improved distillation processes.

Chapter VI., on "Refractory Materials," receives a full quantum of attention. But the author seems inclined to advocate methods which have hardly yet stood the test of time. Nevertheless, it is a good and readable chapter.

Under the heading of "Retort-Bench Appurtenances," the author deals very well indeed with the hydraulic main—a most important piece of apparatus which has been sadly neglected in the past.

In Chapter VIII., on the "Mechanical Handling of Materials," Mr. Meade states that the Arrol-Foulis and West's scoop charger machines are "scarcely consistent with modern requirements"—a statement which, in the opinion of the writer of this review, is not at all in accordance with the practical experience of many engineers, who would prefer to use two machines to give a good result than one to give a moderate result. Assuming that the heavy charge is the correct principle to adopt in working a horizontal retort, it is then of paramount importance to put in a really good charge every time, and not one which depends upon the vagaries of the weather or the size of the coal. Which of the newer machines can do this? It will not, however, be gainsaid that the two above-mentioned types of machines are capable of laying consistently uniform and heavy charges in horizontal retorts. By "heavy" is meant at least 10½ cwt. in a 20 ft. × 21 in. × 15 in. oval retort. If, however, lighter charges are desired, then nothing but good can be said of the more modern machines working from one side of the bench, in which direction there are, of course, many advantages both in initial outlay, saving in labour, and cost of working; but where a nearly full retort is wanted none of these advantages will recoup the engineer for the loss of what he wants—*i.e.*, a uniform and heavy charge every time.

Coal and coke handling plant is dealt with; but the suggestion might be made that a description could with advantage have been given of the latest types of grabs, which are now so largely used in gas-works.

The author deals fully—perhaps too fully, having regard to the magnitude of his subject—with the theoretical considerations involved in the carbonization of coal in Chapter XI., which is followed by the condensation of coal gas—so often quite neglected in practice.

Mr. Meade gives a very good and complete description of the washing and scrubbing of gas under the heading of the "Preliminary Purification of Coal Gas." This is succeeded by the "Recovery of Cyanogen," in which, among other systems, Williams's excellent process of extracting the cyanogen from gas by means of moistened oxide of iron in a purifier is described. This process, which has been adopted by the British Cyanides Company, will undoubtedly revolutionize the whole question of cyanide extraction in gas-works, making commercially possible what was quite impracticable before the discovery of Williams's process.

The question of the "Dry Purification of Coal Gas" is dealt with in Chapter XVI.; and while it is complete in many respects, some extra amount of space might well have been devoted to types of grids, and the methods of getting material in and out of the purifiers.

The author deals in an interesting manner with the "Storage of Gas;" but in regard to certain of his work in this connection, it would be instructive to have the criticisms of Mr. F. S. Cripps. A concluding chapter on "Water Gas" brings Mr. Meade's volume to a close.

Generally speaking, and dealing with the matter as a whole, "Modern Gas-Works Practice" will be an acquisition and an asset to the gas industry, which has latterly had few good books of any pretensions of which to boast—(excluding "Newbigging's Handbook") in fact, not since "King's Treatise" was published. Engineers of gas undertaking should see that their technical staffs are in possession of the publication, which would also make an excellent present for the student just commencing his career in a gas-works. Much praise can be accorded to the author for his work, assiduity in research, and compilation, in respect of which he admits generous assistance. As is natural, there are parts which a critical eye would suggest leaving out, to be replaced by matter which the author has omitted; but these are details which do not detract from the merit of the book, which has made a good impression upon the reviewer.

* "Modern Gas-Works Practice." By Alwyne Meade, Assoc.M.Inst.C.E. London: John Allan & Co. Price 18s.

Captain H. Riall Sankey, C.B., R.E., a member of the Council of the Institution of Mechanical Engineers, has accepted an invitation to deliver the "Thomas Hawksley" lecture this year.

An ordinary meeting of the London Section of the Society of Chemical Industry will be held at the Chemical Society's Rooms, Burlington House, Piccadilly, on Monday next, when the paper to be read will be: "Composition of Power Gases," by Mr. W. A. Tookey.

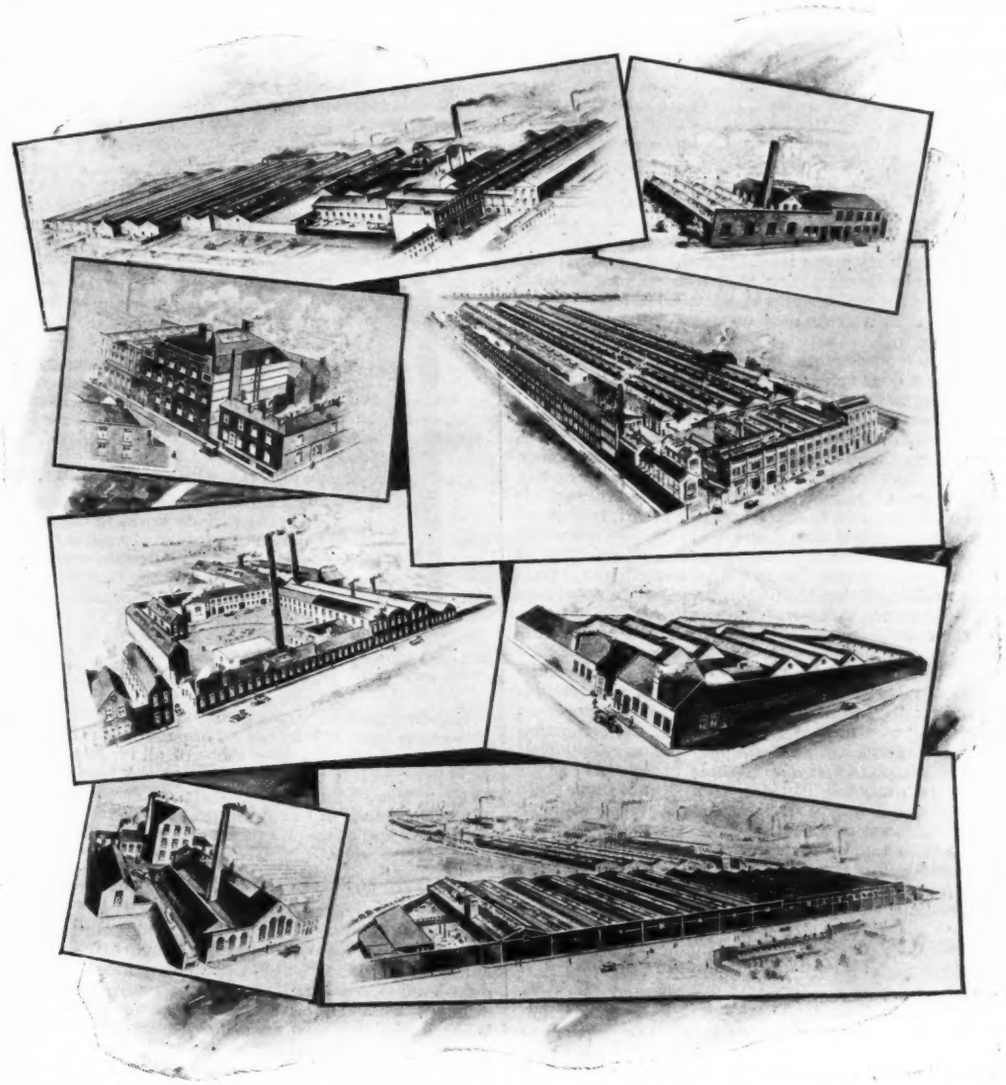
Office lighting and heating by gas, together with the supply of hot water, and cooking of food by the same means for large establishments, are well dealt with in the February issue of "A Thousand-and-One Uses for Gas," issued by the British Commercial Gas Association. Some very efficient installations are illustrated.

ORGANIZATION AND MEETING THE NEEDS OF THE WAR

AT THE COMBINED WORKS OF JOHN WRIGHT & CO.

[With Double-Sheet Illustrated Supplement.]

ORGANIZATION is the order of the day as it never was before. Military organization, organization of munition work, food supply, national service, shipping, and other public interests are all being subjected to the process, which has its goal in higher efficiency. It is a fashion with us British to lament that we have no gift for organization; with us it is supposed to be an exotic plant whose native climate is Germany. Whether or not this modesty be a national weakness or a national virtue, we need not stay to ask. Suffice it to say that whatever may be our shortcomings in organizing faculty as a nation, there are in our midst numerous examples of the faculty effectively exercised; and nowhere with greater *éclat* than in the industrial sphere. Our own particular industry is not without instructive instances of the kind; and there is much satisfaction in knowing that, when war overtook us, there was ready, in such cases, both the existing equipment and the methods, and the needful enterprise and adaptability to successfully meet the emergency.



THE EIGHT WORKS ASSOCIATED WITH JOHN WRIGHT & CO.

FROM PEACE TO WAR WORK.

Two-and-a-half years ago, the eight separate works which are here illustrated, and which had gradually become federated together in certain financial respects, were one and all busily engaged upon a great variety of work—most of it in the construction of gas apparatus, and all of it connected solely with the arts of peace. Their commercial relations not only formed a network over the whole of these islands, but extended to the colonies and to the other continents; and their manufactures found their way to even the most unlikely places on the other side of the globe.

As thunder from a clear sky, came the outbreak of war; and, before more than a few months had passed, this extensive combination of industrial resources had become, in a very great measure, devoted to work for the Government, and for those numerous munition works throughout the country which are serving the Government in connection with the war. Simultaneously, the duty of supplying the *clientèle* of peaceful times is being perseveringly carried on, in so far as the present hampering, but unavoidable, war restrictions upon labour and material permit.

ORGANIZATION OF THE UNIT AND OF THE GROUP.

How was this transformation effected? By what means did this group of works—established on a peace footing and for peaceful work—change themselves into something closely resembling so many sections of a Government arsenal? The answer lies in one single word—Organization. Only a concern already highly organized before the war could have been ready to meet the new conditions as they have in this case been met, and only an excep-

tional capacity for organizing could have grappled with the endless number of practical problems which the complete transformation involved.

For years past, this organization had been maturing along the lines of certain well-defined principles. Primarily, it may be said to have proceeded in two parallel directions—there is the organization within the unit; there is the organization within the group. The former of these, which was naturally of older date, starts out from the laboratories, the designing department, or both, according to whether the particular apparatus is one for domestic use, and therefore involving design not merely from the constructive and technical point of view but also from the artistic, or whether on the other hand it is a gas apparatus for industrial purposes, in which case it is not called upon to figure as a thing of beauty, although (should it for example, happen to be a gas-furnace) it may well be a joy—if not for ever, at least for a much longer time than its solid-fuel-fired predecessor. From the laboratories and the designing department (which might be termed the "incubators"), the apparatus takes a systematic course through the pattern shops, where it first assumes tangible shape, into the foundry, whence it emerges in cast-iron form to undergo the successive processes—constructive and finishing—that eventually land it in the warehouse a perfected article, ready for packing and dispatch. The establishing and maintaining of this ordered succession of processes have involved the training of specialist staffs for each of the various works concerned. In this connection, much time has been spent in the factories of many of the largest firms in the country studying the particular problems with which these firms were faced, and devising methods and special gas-furnaces to deal with these problems. Work thus done in conjunction with the actual users of the furnaces, obviously has a greatly enhanced practical value.

Coming now to the group organization. The same broad principles are at work. Overlapping is eliminated. As regards each class of work, there is concentration in the places best fitted to carry it out. Instead of each works doing a little bit of everything, each works does a great deal of a few things only; and therefore does them well. That this practice has made for substantial economy is a proposition too obvious to need more than mere stating. But it does more; it produces orderly progression throughout, which creates in the mind of any thoughtful visitor a definite sense of reserve power. He feels that with such ways and means—above all, with such ways—there is hardly any fresh call on inventiveness or productiveness which these establishments, jointly or severally, could not promptly meet. For this reason, a visit to one of John Wright & Co.'s group of works is always not merely instructive (it never fails to be that), but, above all things, is encouraging and stimulating. One enters the works with a sense of anticipation; one leaves them with a feeling of fresh confidence—realizing that the prevailing thorough organization, with the organizing power behind it, prepared to meet new requirements, is far more than merely a private advantage to the proprietors of the concern itself; it is also a valuable asset to the entire gas industry.

Paying, the other day, the most recent of a succession of such visits to the works, this effect was markedly felt by a representative of the "JOURNAL." In the face of what was seen, in process and in completion, it was impossible not to feel the conviction that, when an organization has proved capable of adapting itself so promptly and adequately to the present unexampled emergency—to simply and smoothly transfer itself from a peace state to a war state in work—it may be predicted with every assurance that, let the war end soon or late, the same organization will be equal to the further change of reversing this process; and these aggregated businesses, like the ships of a well-disciplined fleet, will be found to promptly answer the helm when once more the order is "full speed ahead."

THE FIELD OF WAR WORK—GAS CONSUMPTION ON THE HIGH SCALE.

With the variety of gas appliances which have formed the staple products of the Company, we have dealt in former issues, and shall hope to deal again on future occasions. The paramount concern in every mind to-day is war work; and our present purpose is, by a few illustrations, to show graphically something of the way in which the organization we have been describing has adapted itself and the uses of gas to war work, and what it is doing in this direction in contributing to the prosperity of the gas-supply industry. On this last point a powerful light is thrown by the fact, gathered by the way during the inspection, that the gas-furnaces supplied by this group of works for the manufacture of war material during the two years ending December, 1916, would, if in operation simultaneously and continuously at full "load," require upwards of 1,600,000 cubic feet of gas per hour.

The accompanying photographs represent a sequence of operations, carried on in the various shops of the group, in the manufacture of gas-furnaces; and towards the end of this article are shown a few photographs of large munition works with the furnaces in operation. About a year ago, in an article that we published, on "Some Uses of Gas in the War,"* there were shown in detail the many operations in connection with shell-making for which these gas-furnaces were being used. The same ground need not again be covered; and, as a prelude to fresh information, it may suffice to merely name the chief processes, and to deal with salient points of interest affecting one or two of these. In the manufacture of high-explosive shells, the firm's various gas-furnaces are used for:

The heating of the solid steel billets for making the shell bodies.
The annealing and heat-treatment processes in connection with the "nosing-in" of the top of the shell body.
The drying of the lacquer inside the shell.
The heat treatment of the copper bands.
The annealing of the brass shell case, and the heat treatment of the shell cases returned from use at the Front.
The heating and mixing of chemicals in connection with explosives.
The fuse socket and body call for both melting and annealing, and also for the tempering of springs.
The high-speed tools used in boring, turning, and shaping the shell bodies are manufactured at one of the group of works; and, in addition, the firm's gas-heated furnaces are used for the hardening of such tools.

* See "JOURNAL," Jan. 4, 1916, p. 22.

AN EXAMPLE OF GAS HEATING IN THE MANUFACTURE OF CARTRIDGES.

In the manufacture of rifle cartridges, these gas-furnaces play an equally important part. For the cupro-nickel bullet sheath (copper 80 p.ct., nickel 20 p.ct.), the metal is melted in certain types of crucible gas-furnaces, and is subsequently annealed in gas-heated oven furnaces, after each successive stamping and drawing process. For the front core of the cartridge (aluminium 90 p.ct., zinc 10 p.ct.), the metal is melted in the firm's gas-heated tilting furnace, and also the metal of the rear core (lead 98 p.ct., antimony 2 p.ct.). The cartridge metal for the brass cartridge case (copper 70 p.ct., zinc 30 p.ct.) is melted in the firm's well-known "Lip-Axis" gas crucible furnaces, from which it is poured into strip moulds. These brass strips are annealed in gas-heated oven furnaces, after each of the successive rolling, stamping, and drawing processes. The copper for the percussion caps is also both melted and annealed in different types of the firm's gas-furnaces.

Rifle and Machine Gun Cartridge.

ALONG THE TRACK OF THE PROCESSES OF GAS-FURNACE PRODUCTION.

The successive processes of furnace manufacture in the various works in the group are shown in the photographs reproduced in the supplement sheet. There are the furnace pattern shops (fig. 1), a corner of the furnace foundry (fig. 2), where the firm's well-reputed methods in the perfection of light castings form an equally marked feature in furnace castings so heavy as to necessitate the use of travelling cranes for carrying them, and also for lifting the huge ladles employed in the casting.

Gas-furnace manufacture such as is carried on in the works of this group finds, it is remarked in passing, employment for a full installation in the machine shops of all types of tools such as are used in high-class engineering shops. A few of these are shown in fig. 3, together with two of Wright's high-speed-tool furnaces in the background. In fig. 4 we have one of the tool rooms; and in fig. 5 are seen lathes and power-saws engaged in the gas-furnace construction work.

RENOVATING THE BRASS CASES OF SHELLS.

In fig. 8 is seen an erecting-shop for large gas-oven furnaces. On the left-hand side of the view is a 30 ft. furnace, by which (the information is given) tubes are annealed by the application of a uniform heat throughout the whole length of the furnace. On the right-hand side is a 24 ft. oven furnace, the purpose of which furnishes a most interesting chapter in connection with the war. When a shell has been fired, the empty brass case which remains behind in the gun is ejected to make room for the next shell. These empty brass cases are brought back to this country, battered, warped, and showing all the stains they have gathered in their course to the Front and home again. Their detonators are first taken out; and the shell bodies are then smoothed out on mandrels in suitable machines worked by women. They are submitted to a scouring in chemical baths; and, having been placed in boxes, they are heat-treated in furnaces such as that shown in fig. 6. After this they are ready for the subsequent processes leading up to the final assembling, as parts of new shells, preparatory to their undertaking a fresh journey to the Front.

The furnace itself is of special interest. It has an endless chain running right through its length, which engages with projections in the bottom of the boxes in which the shell cases are placed; and, by means of gearing shown on the extreme right, it carries these boxes through the furnace at such a rate that, by the time they arrive at the front end, their annealing is exactly complete. The operation takes 15 minutes at 400° C.; and pyrometers fitted to each furnace ensure that this temperature is steadily maintained. From the chain, the boxes are automatically released, and slide down an inclined plane to the floor, where they are taken up by overhead runways for transference to the next department. The illustration shows that the erecting shop for these furnaces

has travelling cranes throughout its entire length to carry into position the heavy castings, and to load up the complete furnaces for dispatch.

FURNACES FOR HEATING THE ENDS OF SHELLS AND "NOSING-IN."

The shop pictured in fig. 7 is that for the erection of special furnaces; the firm having, in addition to their standard types of melting and annealing furnaces, specialized in the designing of furnaces to serve particular purposes. The three large furnaces in the foreground are specially constructed for heating the ends of shells preparatory to the "bottling" or "nosing-in," which forms the pointed end. A two-sided four-hole furnace such as that on the left will, we learn, heat from eight to ten 15-in. shells per hour; and as these furnaces are particularly compact, they lend themselves to installation in batteries so as to produce large outputs. In front of the furnace are seen two trolleys, which support the shell on the sets of upper wheels shown, so that it can be revolved while its front end is in the furnace, and uniform heating thus be attained. A similar arrangement—differing in certain details—may be seen attached to the 9·2 shell-nosing furnace on the right. This furnace, carrying out the two operations required for nosing-in the shells, will turn out ten of these large shells per hour. Further behind, and on the right-hand side, is a nosing-furnace for 18-pounder shells. By the help of the waste heat from the lower furnace, the upper row of holes forms an annealing chamber, to which the shells are transferred after having been heated in the lower openings, and then "bottled" in the hydraulic press. The output of the furnace is forty shells per hour. All three of these furnaces have water-jackets round the front of the furnace holes. These, it is understood, were first made by the firm for the largest steel manufacturer in the world doing work of this kind; and the water-jacket principle has since been universally adopted.

The "nosing-in" department in a shell factory is illustrated in fig. 8. This shows, in addition to several "nosing-in" furnaces, the hydraulic presses used, as well as the arrangement for cooling the shells in lime.

DRYING THE INSIDE LACQUER OF SHELLS.

The gas-oven erecting shop, shown in fig. 9, has in front, in the course of completion, one of a series of ovens made for a large munition works for drying the inside lacquer of 15-in. shells. The shells—which are over 5 ft. high, and weigh about 15 cwt.—have to be carried in and out of the furnace by travelling gear.

MELTING CUPRO-NICKEL FOR BULLET SHEATHS.

The pit type of crucible furnaces are erected in the shop shown in fig. 10. These furnaces have been made for the melting of cupro-nickel for bullet sheaths or envelopes; and they take pots of 250 lbs. capacity, in which the alloy is melted in about 75 minutes, with a gas consumption of 6 to 7 c.ft. per pound of metal melted. As much as 7 tons of cupro-nickel, we were informed, can be melted in a week in one of these furnaces.

The melting of the copper and nickel to form the cupro-nickel alloy is one of the most important and critical things in metal melting; and a few particulars regarding it will be of interest. The copper in the alloy readily oxidizes, while the nickel is keenly absorbent of impurities from the products of combustion, unless special care be taken during melting. Some casters first melt the scrap, then the copper, and finally add the nickel, which latter dissolves in the molten metal, and thus forms the alloy. In other cases, the copper and nickel are put in together. The nickel is not melted by this, but dissolves in the molten copper at a lower temperature than that required for melting pure nickel. At the end of the melt, cupro-manganese is added, as a de-oxidizer; this substance being, by a special contrivance, immersed below the surface of the liquid metal. Throughout all these operations, the utmost care has to be exercised, or the whole melt may very easily be spoiled. There is a critical range of temperature within which the metal must be brought before it is fit to pour. If it is poured at a temperature either above or below this range, the metal is useless; and, while a margin of some 5 p.ct. either way may be permissible, any greater excess may make all the difference. Worst of all is the fact that this misfortune may not make itself evident until the bullet has gone through most of its subsequent processes. Thus much valuable time and labour may be wasted. In this delicate poise of conditions, these gas furnaces are peculiarly helpful, as the desired temperature is rapidly reached, and the melt is not in the furnace longer than is necessary. So that there is the least possible opportunity for the absorption of impurities. These gas-furnaces also repeat the melting operations under precisely the same conditions; and, unlike coke-fired furnaces, they can be timed to an exactitude, because of the perfect control over the combustion.

A FACTOR IN SUCCESS.

An outstandingly powerful factor in the success which the firm's gas-furnaces enjoy is the patent furnace burner, invented by them and known as the "Wright-Brayshaw" burner. Like most good things of the kind, this was not the work of a moment's happy inspiration, but took gradual shape as the result of the combined experiences of the staffs at both the Birmingham and Manchester works of the group. In its construction, they have succeeded in arriving at what appears to be an ideal point, both as regards the conformation and the dimensions of the internal parts. It is known to experts in metal treatment that there are certain temperatures and certain rates of speed in arriving at these which are absolutely necessary to the proper treatment of metals or alloys, particularly among those of high melting-point. To construct a burner by which these exact conditions could be produced with precision and certainty was the aim of the staffs in evolving the "Wright-Brayshaw" burner. The burner permits the consumption of an exceptionally large quantity of gas to be concentrated upon the smallest possible space, and so gives a great intensity of heat within a given space. With this characteristic of the burner is combined an extreme economy in fuel, resulting from the provision for perfect mixture of gas and air; and, therefore, perfect combustion under all conditions.

A test of these furnaces in the melting of cupro-nickel has, we are informed, been carried out by a prominent engineering official. The test extended over several weeks, and uniformly produced results, not merely satisfactory, but remarkably perfect in economy, and in the equality of the melted metal. It is probable that particulars of this test will very shortly be made public from an official source; and when these transpire it is safe, the assurance is given, to predict that they will be found very impressive indeed. In an extensive metal works handling great quantities of cupro-nickel, the full consumption with these furnaces has been found to run as low as from 6 to 7 c.ft. per pound of metal, as mentioned earlier. If it were a question of merely melting the metal, this can be done in these furnaces with a still lower consumption. But the critical range of temperature already mentioned is far above the melting-point; and, to attain this temperature, much more gas has to be used than would suffice for simply reducing the metal to a molten state. It is calculated that the output of a single one of these cupro-nickel furnaces is equal to one-and-a-half million bullet sheaths per week.

Larger furnaces of the same type are made for melting brass, copper, &c., in crucibles up to 300 lbs. (brass), which is, generally speaking, the maximum size where the crucibles have to be lifted out for pouring. In conversation, it was learned that the largest makers of shell fuses in the world at the present time are melting their aluminium alloy for this purpose entirely in Messrs. Wright's gas-furnaces.

TWO SPECIAL PRODUCTIONS—THE TILTING CRUCIBLE AND AN ANNEALING FURNACE.

Two gas-furnace appliances of outstanding importance call for special reference among the products of the group of works. The first of these, the "Lip-Axis" tilting crucible furnace (figs. 11 and 12) is, it was seen, being turned out as rapidly as the large resources of the firm can compass. In this furnace, all "pouring" difficulties are removed by the apparatus being pivoted in line with the lip or spout of the furnace; so that, when the furnace body is tilted by the operator on the platform at the side manipulating the large wheel shown, the furnace body rises, but the pouring point remains the same. The moulds are brought directly under this, either on turntables or traverses, so that the need for ladles or for smaller pots is obviated, and the output is materially increased. There are few metals which are not at present being melted in these "Lip-Axis" furnaces for munition purposes, and, in particular, they are used for the melting of cartridge-metal, to which reference has already been made.

The full charge of the crucible (600 lbs.) is quickly poured; the filling of each mould taking about one minute. Working three shifts, and allowing for cleaning and changing crucibles, each furnace is capable of melting 19 tons of cartridge metal per week, with a gas consumption of 3½ c.ft. per pound of metal melted. So peculiarly do these gas-furnaces lend themselves to a nicety of exactitude in the melting process, that one of the largest metal-melting firms in existence report that they find cartridge metal melted in these furnaces much more ductile than when coke-fired furnaces are used, and that therefore flaws and faults are reduced to vanishing-point. An interesting sidelight on the output capacity of these furnaces is found in the fact that the maximum output of one of these "Lip-Axis" tilting furnaces of the largest size is sufficient to furnish strip metal for 1¼ million of ·303 cartridge cases per week.

The other outstanding apparatus referred to is the equally well-known "Lopress" annealing furnace, which is shown in fig. 13. The special feature of this furnace, upon which its designers evidently pride themselves, is the unique construction of the burner, by which the operator can have at will either an oxidizing flame, or what is aptly described as a "greasy" flame, whichever of these is required for the work in hand. This "greasy" or smoky flame is essential for the correct heat treatment of steel; and it is the peculiar success of the "Lopress" furnace burner in giving this that has brought the furnace into considerable request in these munition-making times.

A LARGE ANNEALING FURNACE.

In fig. 14, is seen one of the firm's annealing furnaces in operation in a large steel works, where it is employed for annealing steel bars and castings. With some amount of pride, it was incidentally mentioned to us that they have lately received a letter from a firm employing their furnaces, stating that the gas consumption for annealing steel bars is not more than 2500 c.ft. per ton—an extremely low cost, particularly when the perfect results of annealing by gas-furnaces are taken into account.

HIGH-SPEED TOOL STEEL.

Nothing has played a more conspicuous part in bringing munitions output to the magnificent position it occupies to-day than steel

—and particularly high-speed steel—tools, in every conceivable variety; and the contribution made in this department by the firm's tool-steel works will be found to have been of no small consequence when the time comes for a more open review than is at present permissible. Messrs. Brayshaw, it is commonly known, have a scientific knowledge and many years' practical experience of high-speed tool steel manipulation in all its processes, which may almost be called unique. Alone among the firms engaged in such work, they are not merely makers of the tools; but, like the associated concern, John Wright & Co., are makers of the furnaces in which the tools are treated, and again in turn makers of apparatus in the manufacture of which the tools are employed. The immense advantage to both concerns of thus constantly learning, by first-hand experience, the exact result of every new tool-making method adopted is manifestly very great indeed.

The subject of chemical quenching baths for high-speed steel tools is one that Messrs. Brayshaw have made peculiarly their own. In addition to their business in this country, many tons of their "Feusalt" are being regularly despatched to the United States, Canada, &c., for the hardening of similar tools there.

Horseshoes Mechanically Made.

In the ordinary way it may seem a far cry from munitions to horseshoes; but the connection in war-time is obvious enough, and the process of manufacture, in gas-furnaces specially constructed by John Wright & Co. for the purpose [as shown towards the right of fig. 6] is well worthy of remark. Long round bars of metal, just over 1 in. in diameter, are placed in the furnace—say, ten at a time—and heated for a distance of 18 in. from the end, while jets of compressed air keep the remainder cool, to localize the heat. They are raised to welding heat—indeed, are dropping melted metal as they leave the furnace. The white-hot end of the bar is placed in a little machine having a horseshoe-shaped ridge, round which it is bent in a single operation by a boy operator manipulating a lever. It is instantly removed to a drop stamp, where two or three blows shape and finish it, and other two blows cut off the "fin," and shear off the unused portion of the rod respectively. Even in the making of a horseshoe detail is important. In this process, as in so many others to which gas gives a unique degree of accuracy, the metal must be at the exact temperature at which it will "flow" easily in the die, so that the little front projection of the shoe may be perfect.

Helmets, Gun Shields, and "Tank" Plates.

The photograph supplying fig. 15 is particularly interesting It shows an extensive factory where steel helmets and trench and gun shields are made, and also the steel plates for the celebrated "Tanks," which when they first appeared on the Somme seemed to have suggested to the foe that some prehistoric monster had emerged from the mud of the river bed. In this particular factory, the output of which is devoted more to the defensive protection of troops than to actual munition manufacture, 33 of the firm's gas-furnaces are in use, so that a direct series of links connects gas "tanks" with the military machines bearing the same name.

The information in this article gives a general outline of what was seen and heard during the visit to the works of Messrs. John Wright & Co., omitting much detail, upon the publication of which, naturally, an embargo is laid. The article shows, by illustration, of what immense national value to the country in this war have been the organization and adaptability of our great industrial establishments, and how well there has been response by our factories to the call throughout the ramifications of production that the immensity and intensity of the war has demanded.

Calorific Standard Orders and Applications.—The Local Government Board have made the Order asked for by the Wath and Bolton Gas Board; and it is on the same lines as that of the Leeds Corporation, which was noticed in the "JOURNAL" for Jan. 30 [p. 216]. The Board of Trade have made an Order for the Kingston-upon-Thames Gas Company; and they have received an application for one from the Chertsey Gas Consumers' Company, Ltd.

Ammonia Pump Rods.—The life of piston rods in ammonia pumps is comparatively short; the packing has frequently to be renewed to prevent leakage of ammonia; and the renewal itself involves some loss of ammonia. Mr. D. L. Fagnan [according to "Power" for Nov. 14 last, quoted by "Engineering"] addressed inquiries to operators, and was informed by twenty-five operators that they had to repack the rods every three weeks, and to renew them every three months; and the reports from ammonia pump manufacturers corroborated these statements. Experimenting with different pump-rod materials, he found, however, that high-grade tool steels, provided with a fibrous packing symmetrically arranged about a central insertion of Babbitt metal, will wear well. One of these rods had been running a year—eighteen hours per day in summer and six to eight hours in winter—and the wear was only 0·002 in. The rod is kept lubricated by five or six drops of oil per minute; and the smell of ammonia was only noticed when a new rod was started.

ON THE NEED OF DEPARTMENTAL HARMONY.

WITH SOME PRACTICAL SUGGESTIONS.

By A. CANNING WILLIAMS, Treasurer to the Edinburgh and Leith Corporations' Gas Commissioners.

"Beware of entrance to a quarrel."—*Shakespeare.*
"Weakness on both sides is, as we know, the motto of all quarrels."—*Voltaire.*

In these days of depleted staffs, inexperienced assistants, and general stress and strain, it is more than ever necessary that the utmost good feeling and mutual helpfulness should characterize the relationships between the secretarial and the engineering departments of a gas undertaking. The author uses the former adjective in a broad sense, as covering (as it usually does) the cash and accountancy work, as well as that of a purely secretarial nature.

It is natural, and, if kept within bounds, salutary, for there to be a spirit of rivalry between the two departments. It leads, as a rule, to greater efficiency and initiative, and so prevents stagnation. The danger is that the spirit may degenerate into one of jealousy, with its attendant evils of friction and ill-feeling. It may be hidden from the eyes of directors and town councillors; but there it is—eating like a canker into the very heart of the concern, and doing it incalculable injury. Heads of departments should be extremely careful not to set a bad example in this respect, by showing animus to each other, or by adversely criticizing, in the presence of their subordinates, the way in which "the other man" manages (or mismanages) his branch of the establishment. The staff have a way of unconsciously imitating their chief; and if they discover that the secretary entertains a poor opinion of the engineer, or *vice versâ*, they echo this sentiment, and a miserable condition of internecine warfare ensues. I once knew two men (they have been dead many years) who held the positions of manager and secretary respectively of a gas company. They both had offices on the same floor, and so bitter was the feeling between them that they never had personal intercourse, except upon compulsion, and passed each other with a scowl when they met upon the stairs. The sad part of it was that they were father and son.

It is, perhaps, necessary that I should observe that it has been my good fortune hitherto to be associated with engineers and managers (seven) with minds too broad and hearts too kindly for jealousy and bitterness; but—well, I have moved about among my *confrères* and have occasionally heard things!

"Life is Too Short for Friction."

I once spent a few pleasant days with the secretary of an important gas company in England; and, in the course of some heart-to-heart talks, he unburdened his soul to me. He told me (I can recall the conversation as if it had taken place but yesterday) that his official life was made wretched by constant misunderstandings and friction between his department and the engineer's. "The engineer is not a bad fellow at all at bottom," he said; "a bit too pushful and grasping for my taste, perhaps. But we all have our faults. He is a busy man, and has to leave a great deal of detail work to his subordinates. Now, his chief assistant and mine are not, through some ancient grudge, on good terms. You can imagine what happens. They watch each other like jealous dogs, and report to him or to me every trumpery little thing in the way of an error or an omission that comes in their way. Each of us, I suppose, is inclined to accept the *ex parte* statements of his assistant; and so I am afraid we are both sometimes made tools of by the very men who should do their best to smooth our paths. The result is that the engineer and I write complaining letters to each other on trivial matters which should never require our attention at all." I asked him why he did not find his assistant a new job, or hint to him that he might seek one elsewhere. He replied that he was a very capable man, and had been with the company for many years. "Besides," he added, with a meaning smile, "he is a nephew of the chairman."

The moral, of course, is that a chief should be on his guard when a complaint as to "the other side" is brought to him (no man's statement should be trusted against his enemy); and if he should find, on making investigation, that a mountain has been made out of a molehill, he should let it be clearly understood that a repetition of that kind of engineering would not be tolerated. He should also avoid letters on these topics as he would the plague. They merely add fuel to the fire. "The pen may be a surer, but the tongue is a nicer instrument," observes the wise Sir Arthur Helps, in his excellent series of "Essays Written in the Intervals of Business." "Life is too short for friction," as a former colleague of mine was fond of saying, when there were faint indications that heat was about to be generated between us; or, as a philosophical old gas company director once observed to me, "Quarrelling with a colleague is like quarrelling with one's wife—you have to live with him afterwards."

And now, descending from the general to the particular, I will give a few illustrations of, and suggestions concerning, that harmonious working which is the text of my discourse. They may seem rather trifling, and so they are—unless you neglect them.

CORRESPONDENCE.

In spite of notices on gas demand-notes that letters of complaint as to the supply of gas, &c., should be sent to the engineer, many consumers persist in addressing them to the central office. As it is important that the engineer's department should receive these complaints in good time, the secretary should make arrangements for the letters to be dispatched to the works with the least possible delay.

The following plan of dealing with correspondence, when fairly heavy, can be recommended: A junior clerk has instructions to be at the office at a few minutes to nine, and to sort the letters into three classes—viz., (1) Letters addressed to the engineer; (2) letters addressed to the company; (3) letters addressed to the secretary. When the secretary arrives at nine o'clock [raise not your eyebrows, ye who enter upon the scene of your labours when the morning is half-spent!] he is joined by a senior clerk, and the boy cuts open the envelopes of classes (2) and (3), still keeping them in separate piles. The secretary removes the contents of the envelopes of group (2), and, after a quick glance at them, tosses them to his assistant, who is standing at the other side of the table. The clerk has three baskets near at hand, marked respectively "Secretary's Department," "Engineer's Department," and "Both Departments." After stamping the letters with the date and hour of receipt, he casts a rapid eye over them, and places them in their appropriate receptacles. The boy next takes a large envelope, and inserts in it the letters addressed to the engineer and those from the engineer's basket. By ten or twelve minutes past nine the packet is handed to a motor cyclist, and by 9.20 it is delivered at the works.

The secretary then, at his ease, deals with the communications which refer to subjects that affect both the departments (urgent matters, such as escapes, "no gas," &c., being telephoned to the works), and finally with those relating to his own office. Among the former there may be, for example, a letter from a consumer who, in remitting a cheque in payment of an account, asks for a man to be sent to remedy a defective cooker. In this case the request would, as already explained, be telephoned to the engineer's office, and the following printed slip (5 in. by 3 in.) enclosed with the receipted account:

———— GAS COMPANY.

[ADDRESS.]

.....191

The Secretary begs to acknowledge the receipt of your letter of....., with cheque, and returns herewith the account duly discharged,

He has drawn the attention of the Engineer and Manager to your remarks *re* .....

If any further communication on this matter should be necessary, kindly address direct to the Engineer and Manager at the Gas-Works.

As the letter is of more importance to the engineer's department than to the secretary's, it is sent to the works with the midday letters, marked by a rubber stamp thus:

———— GAS COMPANY.

Correspondent informed by the Secretary that h.. Communication has been sent to the Engineer for attention.

.....19

In cases where the secretary decides to retain a double-barrelled communication, a letter (following upon the telephone message) is sent to the engineer, in which the consumer's complaint, or what-not, is transmitted. Printed forms [8 in. by 10½ in.] with blanks are used, and duplicates are obtained by carbon paper:

———— GAS COMPANY.

SECRETARY'S DEPARTMENT.

[ADDRESS.]

To

————, ESQ.,

Engineer and Manager.

DEAR SIR,

.....

I have received a letter from the above, dated....., in which.....says that.....

.....

I have informed.....that I have drawn your attention to the matter.

Yours faithfully,

Secretary.

It sometimes happens that the secretary's postal packets include such alien missives as coal consignment notes, orders from coke merchants with whom the company has regular transactions, requests for quotations for fitting-work, &c. Persons who habitually offend in this direction should be politely educated to better ways:

[POSTCARD.]

———— GAS COMPANY.

[ADDRESS.]

(Date as per Post Mark.)

The Secretary would be greatly obliged if you would be so good as to address future..... direct to the Engineer and Manager at the Gas-Works.

TACTLESSNESS.

A tactless and unimaginative secretary or engineer may, without perhaps knowing it, cause irritation to his colleague by dealing with matters which do not strictly come within his department. A proper observance of professional courtesy requires the avoidance of all acts of encroachment. Let me give a single and a simple example. I will assume that the engineer receives a letter from a consumer complaining of an escape of gas, and asking for an extension of time in which to pay his gas account. If he were to grant the request, he would be committing an act of trespass. The probabilities are that the engineer would not know whether the consumer was a "good payer" or a "bad payer"—the worst sinners in this respect have usually the most plausible pens and tongues—whereas in the secretary's department his character would be well known. Obviously, the right course would be to pass on the request to the secretary, and intimate to the consumer that this had been done.

The equilibrium of the engineer is likely to be upset if he receives, just at the time when his men are busy meter-reading, a long list of consumers in arrear whose supplies are to be cut off. It is, I know, difficult always to arrange matters in such a way as to avoid this; but the secretary should use every endeavour to do so. He should also try to send the list early in the week, so that those consumers who pay a day or two after they have experienced the inconvenience of being without gas may have their supplies renewed before Saturday, when the pressure in the distribution department is high.

I am conscious that I may be preaching to the converted (I am not ordained to preach at all); and to multiply illustrations, though it would lengthen my sermon and weary my readers, would not point my moral or adorn my tale. The great thing to ensure the harmonious working of departments is for the heads of them to cultivate a spirit of kindliness and mutual consideration—in short, to put themselves in their colleague's place, and try to appreciate his point of view. Then if any little hitch does occur, as occur it will occasionally, each will know that it was not brought about intentionally by the other, and both will do their best to find a remedy. After all, "what is there in this world's goods which should sharpen our spirits, and make so many kind-hearted brethren of us fall out so cruelly by the way?"

THE MONOMETER WHITE METAL FURNACE.

The "Monometer" white-metal furnace is said to ensure a perfectly homogeneous alloy; and the oxidation is reduced to a minimum by the Monometer Company's (Aston, Birmingham) system of enclosing the melting pot and bringing the inert gases from the burners into the chamber above the pot. The Company's self-acting heat controller is also fitted, and, by acting on the gas supply, automatically prevents metal from being overheated.

Other novel features of the white-metal furnace are the mixing arrangements and the valve-controlled outlet. The mixer is in the form of propeller blades rotated in the melting pot by an external hand lever; the weight of the mixer being borne on a ball-bearing. Passing down the centre of the mixer-sleeve is the valve-stem; the valve being cone-seated and operated by a screw and hand wheel. By this means, the flow of molten metal is accurately controlled. The melting pot is of the Company's patent Tantalum iron, adapted to resist the action of heat and molten metal. The metal is tapped from the bottom of the pot, and is thus free from dirt or dross. The furnace is fitted with the firm's patent burners for use with town gas or producer gas. The inventor and patentee is Mr. I. H. Hall, the Managing-Director of the Company.

In addition to the melting furnaces here described, the Company have a heating oven for raising the bearing shells to the correct temperature for tinning. These ovens have a similar automatic heat control. There is no guesswork as to the correct temperature for tinning; the moulds being withdrawn exactly at the right heat.

Volunteers for National Service.—There are mentioned on the form of offer to be used by volunteers for national service twenty trades for which male volunteers between the ages of 18 and 61 are specially wanted. The trades and occupations of primary importance include coal mining, manufacture of coal-tar products, manufacture of coke, public utility services (which include gas-works).

A CHEMIST'S CLUB.

A PRACTICAL step towards the formation of a club for chemists in London has been taken by the London Section of the Society of Chemical Industry. The present Honorary Secretary, Mr. T. D. Morson, who took office about three years ago, has long cherished the idea of stimulating the social side of the activities of the section in the direction of bringing the members together more than is possible in what has been termed the frigid atmosphere of the monthly meetings at Burlington House. Indeed, we believe there was for some years a select gathering called the Dining Club or some such name which apparently defeated its own ends by its very exclusiveness.

However, the idea was conceived this session of holding informal meetings of the section under more convivial surroundings than Burlington House, and in addition to the usual monthly meetings. The first of these was held in December; and it did not take long at that meeting for the concrete proposal to form a Chemists' Club to be put forward. A Committee was appointed to go into the matter, and a report was presented at another informal gathering at a city café on Monday, Feb. 19. Practical and financial difficulties, however, were encountered; and the possibility of the club premises belonging to the London Section has had to be shelved for the present.

In the first place it was quickly found that the Government demands upon hotel accommodation in London has resulted in it being impossible to rent (say) two rooms at a hotel, where the members could be catered for. Consequently the Committee were thrown-back upon the expedient of hiring empty rooms and furnishing them, and making arrangements with a caterer to look after the refreshment department. Quotations were obtained; and it was quickly seen that a capital fund of £1000, together with a fairly heavy subscription, would be necessary; and the Committee, feeling that such a scheme at the present moment was inopportune, came back to the members of the section with a statement of the whole position, in the hope that some other arrangement could be developed.

After considerable discussion, it was decided, tentatively, to arrange for fortnightly dinners at a City restaurant where the members of the London Section can meet under more or less clublike conditions. The Committee who have been dealing with the scheme are to continue in office, with the object of gradually working-up to a club in the real sense of the word, when times are more propitious, and when we are a stage nearer to the federation of chemical societies and institutions, so that there shall be a club for the chemical industry and not merely one for the members of one society. The Chemical Club of Manchester was developed on somewhat similar lines, without reference to particular societies; and there are many representatives of the gas industry who are members.

So much for the club. The informal meeting held yesterday (Monday) week was also concerned with the means for increasing the membership of the London Section; and in the main it is felt that the fortnightly dinners which are to be held will tend in this direction. There are one or two other aspects, however. Chemical manufacturers complain that they hear little of the Society, which was primarily formed for the benefit of the manufacturing industry; and it is a question (as mentioned by the Chairman of the Section) whether the work has not become too large for an Honorary Secretary. The membership stands at one-quarter that of the whole Society, yet it has not appreciably increased during the last twenty years; and the possibility of the appointment of a paid Secretary to work under the Honorary Secretary is at any rate in the mind of the Chairman.

Another thought of Mr. Ling is that the Society's "Journal" should be improved, even to the extent of developing it into a weekly magazine. Mr. Ling thinks that the Society, with its vast resources, could arrange for a better publication than could private enterprise. Apropos of this and of the increase of membership, Mr. W. J. A. Butterfield suggested that more attention should be given to gaining publicity for the Society's meetings. One of the features of Burlington House, of course, is that no accommodation is provided for the Press; but our own experience is that Mr. Morson and Mr. Ling, the Chairman of the section, are extremely courteous and, far from placing obstacles in the way, give every assistance at the meetings when matters germane to the gas industry take a "JOURNAL" representative there. The Society does, however, suffer in comparison with others, in that no papers or abstracts are provided at the meetings; and it is an unwritten law with authors that not too much must be published anywhere else until after the Society's own "Journal" has dealt with the papers that are read. That is what was in Mr. Butterfield's mind. But there are differences of opinion on the point; and in the general overhaul of the activities of the London Section which is apparently going on, this will no doubt receive careful attention.

The Council of the Institution of Mechanical Engineers, in their annual report, had unfortunately to report the decease of a considerable number of members. Among the names, with the dates of their election, appear those of Sir Corbet Woodall, D.Sc. (1882), Mr. William King (1872), and Sir Hiram S. Maxim (1884).

LIGHTS AND EYESIGHT.

The members of the Illuminating Engineering Society were occupied at their meeting last Tuesday with the consideration of the subject of "The Effect on the Eye of Varying Degrees of Brightness and Contrast." The author of the paper (which covered considerable ground, and from which we can only give a few extracts) was Dr. JAMES KERR, of the Public Health Department of the London County Council. The President (Sir William H. Bennett, K.C.V.O., F.R.C.S.), was in the chair.

The author referred to the importance of the subject in view of the work called for from the eye. The subject of glare, put in the forefront of the Society's activities, has enormous practical bearings. One may not hit a man on the comparatively insensitive skin without running the risk of legal or other penalties, but may with impunity, literally hit him in the eyes with a 1000-c.p. beam. Short, however of this, the effects of glare are daily felt and far-reaching. Lighting belongs to the amenities of life, and can be made an artistic pleasure if scientifically used, but can be the very reverse by becoming a vulgar intrusion or glaring disturbance. Individuals differ much in their reactions. A healthy muscular labourer could, without remark, endure hours of lighting conditions which in a sensitive, less well nourished, or possibly chronically fatigued, worker might be the cause of lasting distress or ill-health.

The author proceeded to sum up the simplest physiological aspects of vision which should be kept in mind if the art of illumination is to be made a pleasure instead of an infliction. He treated the subjects under the headings of fundamental properties of the eye, the importance of adaptation in the eye, the retinal structure, the effect of chromatic aberration, and then he came to

THE ABSOLUTE GLARE LIMIT.

The author said: Turning now to another aspect of glare—that from bright sources. With every eclipse of the sun, cases are recorded where individuals looking at the partially eclipsed sun without protecting glasses, receive permanent damage. The sensitive layer or the nerve structures about it are burned out functionally at the macula, and a permanent black spot remains on the field of vision. This represents the extreme case of glare from high intrinsic brilliancy.

After any bright object is looked at, the destruction of visual purple and accompanying changes are so rapid and intense that time is taken up in the restitution of the original condition; and during this time after-images occur. They should normally disappear in the fraction of a second; but with intense light, or with poor circulation in the eyeball, or certain depressed conditions of nerve structures, these after-images may persist to such an extent that glaring effects result. In this connection fatigue and excess of tobacco are always to be thought of. Mere glare effects from continued images of the source of light in the field of vision may be quite exhausting. Apparently the maximum brightness which the eye is prepared for through its long course of evolution is the brightest sky, apart from the actual image of the sun. That Nature has prepared us for this may be judged from the pigmentation of the eyes of southern as compared with their slighter coloration in northern races. This amount is generally taken as 2·5 to 3 candles to the square inch; and some such amount has been suggested as the standard for any visible sources of lighting.

INDIRECT AND SEMI-INDIRECT LIGHTING.

Indirect lighting may accomplish this to perfection; but the semi-indirect can also be utilized if the actual incandescent source is used as a primary to light a sufficiently large diffusing shade which will act as a secondary source, which can be looked at steadily without hurt to the eye. Indirect lighting has its restfulness due to its diffuseness and absence of high intrinsic brilliancy on any surface. The eye is saved much fatigue by absence of violent contrasts, and by not having to pass from a comparatively dark surface to an incandescent one quite suddenly. On the other hand, as it is only through shadows that objects are seen, comparatively shadowless lighting—while useful for general illumination apart from special eye work, or for the examination of plain surfaces, reading or writing—is not so useful where small objects or textural surfaces have to be examined. It would thus be good in a bank, but bad in a school. Direct lighting is the most economical method for handling objects or manufacturing processes; but here again if the light source is not kept out of the field of vision, or shaded-down to the 3 c.p. per inch standard for any visible surface, it will cause strain and fatigue.

EFFECT OF CONTRAST.

The matter of contrast is of very great importance not only in regard to light sources which may be the cause of after-images, and distribution of light, but also for such problems as the kinema screen. Excessive or defective contrast may be equally troublesome. The New York Committee who investigated glare a couple of years ago stated that vision was best with contrasts about 1 : 20, but was possible at 98 : 100, and could be done without discomfort up to 1 : 100. In sunlit scenes out of doors, excluding the sun itself, the contrasts rarely exceed 1 : 20. Indoors

not over 1 : 200, although window frames against a bright sky may give a contrast 1 : 10,000. They thought it probable that the comfortable limiting ratio lies between 1 : 100 and 1 : 200, and preferably should be kept below 1 : 100.

This appears to me an important suggestion. It seems to take into account the admitted fact that a bright object is more distressing to the eye when presented with a dark background, than if seen amid relatively bright surroundings, owing to the adaptation of the eye. In full daylight with an eye adapted to relatively great brightness, even an incandescent filament may not appear very glaring, whereas in the dark a lighted match, held near the eyes, produces temporary dazzle. The factor 1 : 100 appears to have been suggested mainly by practical experience. It was suggested in Prof. L. Weber's contribution to the discussion on glare in 1910; but it would be more satisfactory if detailed physiological evidence in support of the ratio could be obtained in the laboratory.

Practical Illustrations of the Effect of Contrast.

Even in cases where the surfaces are of moderate brightness, and no extreme form of glare would be imagined to exist, an extreme contrast, or a contrast operating in the wrong direction, may be inconvenient. In some cases the continued fixation of a brightly lighted spot on a stage, with the rest of the field of view in complete darkness, entails a strain on the eye. The fixing of a desirable limit to contrast has also a bearing upon local illumination. It is hardly possible to lay down the law that either "local" or "general" lighting is invariably best; but the extreme contrast present when a workman is engaged on fine work, and using a powerful shaded light operating over a small area, with the surroundings in complete darkness is undoubtedly trying. Here again a limit to the contrast might well be prescribed. This raises one other question. Should there be also a limit to uniformity? The view is often expressed that completely uniform lighting (were it attainable) would also be trying to the eyes. Is extreme monotony of brightness also objectionable? This is a matter on which very little physiological evidence is available; but there seems ground for the belief that the best conditions involve an illumination on the object viewed greater than that given to the surroundings. It is, at all events, generally agreed that when the contrast is reversed—*i.e.*, when the illumination on the work or object viewed is actually less than the general illumination—the visual effect is prejudiced.

Illumination for Distant Objects.

It may be added in passing that while the illumination needed for close work is fairly well understood, the conditions for relatively distant vision have been less studied. For example there is general agreement that for reading good type on white paper 2 to 3 foot-candles is the minimum desirable. But the corresponding illumination required for lighting targets, blackboards, and illuminated signs and notices to be viewed from a distance has been little studied. Assuming that the angle subtended by the detail at the eye, and the contrast between this detail and the background are the same, would the illumination necessary be different according as the object is viewed at a distance of (say) 1, 5 and 20 and 100 feet? Probably it would be considerably greater. Again, if we assume that 2 to 3 foot-candles is needed for close observation of good type on a white background, how far will higher illumination enable us to perceive fine detail which cannot be clearly seen at the above illumination? And to what extent will a higher illumination aid us in perceiving detail if the contrast is less than that presented by black letters on a white ground? An investigation on practical lines into these matters would yield results and might have an important bearing on the question of the amount of illumination necessary for different classes of work in factories.

Glare from "Successive Contrast" and Flicker.

The effects of glare are due to simultaneous contrast. A corresponding effect occurs when the eye sees surfaces of vastly differing brightness in succession. For example, when we pass from a brightly lighted room into the darkness outside, the eye, being adapted to the brilliancy inside, can see little until it has become adjusted to the lower brightness. The present darkening of London offers many examples of this effect. The alternate patches of brightness under lamps and darkness between them are doubtless distracting to drivers and pedestrians whose eyes are required to adjust themselves to the altered conditions as they pass from one region to another. This is an argument in favour of more uniform illumination.

An extreme instance of such an effect is met with in the case of a flickering, unsteady illumination, which is notoriously trying to the eyes. Flicker is rather a mysterious subject, which would require separate treatment. It seems more evident to the peripheral retina than on the macula, and is due to alterations in light and shade slow enough to evoke continual efforts at adjustment. It is in this respect perhaps that the pupillary contractions of the iris are most to be regarded. This effect might also receive the attention of the Society, though it is obviously more difficult to specify, as it includes both time and brightness. It should not, however, be impossible to specify the steadiness of sources of light and to state approximately the amount of flicker which is distinctly perceptible to the eye, and therefore objectionable. Such fluctuations may occur either on a fluctuating gas supply or an electric lamp run off an alternating supply of low frequency. With alternating current, the point at which no flicker is perceptible depends on the damping effect of the filament, and the duration of an impression on the retina. This is attained in about 1-20th of a second in average light and 1-50th of a second in very bright light. If the frequency exceeds 50, as is generally the case, there should be in general no perceptible variation in the case of stationary objects. The brightness of the light is a material factor. Therefore it is conceivable that an effect which is inappreciable if one looks straight at the filament might be detected if one is observing an illuminated object of much lower brightness.

As is well known, inconvenient effects may be produced by moving objects illuminated by alternating arcs. At a certain period of revolution, rotating machinery may even appear stationary—an obviously dangerous effect. This method of lighting should not be employed for the illumination of moving objects. The corresponding effect of electric incandescent lamps on alternating supply is very much less, but might in some circumstances be appreciable.

DISCUSSION.

The President said that the members had listened with the greatest interest to Dr. Kerr's learned communication. The importance of proper methods of lighting generally was receiving more and more attention in these days; and this was largely due to the work of the Society. The most important of all the questions affecting perfect lighting were those of glare, flicker, and strong contrasts.

Mr. J. S. Dow referred to a number of written communications received on the subject of the paper. Among them was one from Mr. Bishop Harman and another from Dr. Ernest Clarke, M.D., F.R.C.S.

Mr. Bishop Harman said that before the war people were living in the spacious times of unlimited evening illumination of their towns. In these days of darkness, the state of the streets of the big cities had proved positively that very little thought had been given to the attainment of a system of illumination which would be both effective and comfortable. In pre-war days, the exposure of flame-arc lamps in rows in front of shops at very little above the level of the heads of people was distressing to a high degree. Not less troublesome, but much more dangerous, was the bewilderment caused by the innumerable twinkling lights that surrounded one in the passage of a great darkened square or street. Trafalgar Square was a terrible place on a dark clear night when there was no haze to distribute the rays of the lights or deaden those at a distance. That such a state of affairs was quite unnecessary was proved by the recent changes in the street lamps in Marylebone. Here the upper part of the glass in the region of the metallic filament lamp was covered with a band of paper, the rest of the glass was thickly stippled with white paint. The effect was to reduce the specific intensity of the light, increase the luminous surface, and produce a delightfully soft glow at once illuminating and comfortable. It would seem doubtful policy to attempt the prescription of any specific standard of lighting for general purposes. Minima were necessary. But minima should not be allowed to become the maxima. The one thing that should be insisted upon was the relative illumination of the parts of the same place. Dr. Kerr had wisely emphasized this as the chief factor for comfortable vision.

Dr. Ernest Clarke said there was no doubt about the truth of Dr. Kerr's statement, that extreme contrast between the brightness of an object and that of the general surroundings was most objectionable. There was no doubt that the glare of light had had of late years many more victims, probably due to incandescent gaslight not being properly masked and electric light not being properly diffused. Naked incandescent or electric lights should never be fixed on the eye-line, and should be placed high up or low down, and then carefully shaded. The best form of illumination was reflected light; but unfortunately the cost of this and its extravagance militated against its general adoption.

The discussion got largely on to the track of cinema theatre lighting—among the speakers being Dr. Kimmins, Mr. Newbold, Mr. F. W. Goodenough, Mr. E. T. Swinson, and Mr. Leon Gaster.

Dr. Edridge Green said that for the last twenty-five years he had considered it a fundamental principle of lighting that, in order to see with the centre of the retina, they must have the periphery stimulated. People had complained to him about having headaches under different systems of lighting; and the first question he asked them was, "Do you use a reading lamp, and have the rest of the room dark?" "Yes." "Do you play at bridge tables that are lighted, while the rest of the room is dark?" "Yes." "Do you go to cinematograph shows?" "Yes." "Then what you have to do to get rid of your headache is to have not only your concentrated light, but at the same time a light round the room."

Mrs. A. M. Cloudesley Brereton advocated that steps should be taken to get working men and women interested in the questions that Dr. Kerr had raised. If intelligent working men and women could be brought to see the importance of such things as this, better results would be obtained in many of these techni-

cal questions in which the members of the Society were concerned. Such appreciation by those who had to work by lights in factories would do much to quicken the application of suitable lighting regulations.

Mr. A. CUNNINGTON (L. & S. W. Ry.) remarked that one direction in which they wanted more knowledge was that of intrinsic brilliancy. He had been trying one or two experiments with different lamps; and these seemed to suggest that it was not necessarily the projected area of the filaments that they ought to take, but that in some cases it was the apparent area which met the eye. In the case of the metallic filament lamp, they had a group of filaments, and the projected area of the filaments was that taken up by the filaments alone. But when they took the case of the gas-mantle, the intrinsic brilliancy was taken on the whole area of the mantle. But the gas-mantle was not a solid; it was only a woven mesh, and the area of the mesh was considerably less than the outside of the mantle. He was led to look at this question by some intrinsic brilliancy figures by Dr. Stockhausen; and he could not make the figures agree so far as his own eyes were concerned. The average incandescent mantle, according to Dr. Stockhausen, worked out to 6 candles per square centimetre, whereas the average filament lamp worked out to something like 180 candles per square centimetre. Putting the gas-mantle and the electric filament lamps side by side, such a large difference could not be detected by the eye. With the metallic filament lamps, there was a large space between the filaments which gave relief to the eye. To take only the projected area of the filaments did not, to his mind, supply a guide to the amount of dazzle.

Mr. J. G. CLARK (Gas Light and Coke Company) said he had listened with much interest to Dr. Kerr's lucid paper. One thing that struck him was the number of questions the author asked, which only showed what a fruitful future there was before the Society. Dr. Kerr made some observations on the uniformity of illumination, and asked in the case of poor visibility at 3 foot-candles whether better visibility would be obtained at higher illuminations. In this connection, he (Mr. Clark) would like to point out that, in his experience in factories and such-like places, the workmen—particularly skilled men—liked to have the opportunity of choosing a degree of illumination suitable for the particular job they were on. In practical lighting, it frequently happened that the units were spaced to give a gradient of illumination along a workbench. They might have 6 foot-candles underneath the lamp, and then tailing-off to (say) 3 foot-candles before the illumination was overlapped by the light from the next lamp. The workman then had a choice between 6 and 3 foot-candles with intermediate variations, of which, in his (Mr. Clark's) experience, advantage was very frequently taken. This seemed to give an affirmative reply to Dr. Kerr's question. For the same reason, high-class workmen had often asked him to provide them with a light that could be raised and lowered. Respecting permissible brightness, something between 1 and 3 candles per square inch was generally regarded as satisfactory; but whatever value was accepted, it seemed necessary to take into account the angle of vision. Could Dr. Kerr tell them whether light sources outside the range of actual vision were likely to influence vision. It brought them to what was sometimes described as the "angle of glare." Dr. Kerr made some observations on contrast. They reminded him (Mr. Clark) of a paper read by Mr. Mackinney and himself a few years ago, in which some photographs were shown of a variety of sources—gas and electric—with various kinds of equipment taken first against a dark and then against a light background. They appeared to show that a source that was painfully bright against a dark background was not so against a light background, and that it might not be correct to be too narrow in their limits of permissible brightness. Circumstances seemed to alter cases. The last speaker's remarks on intrinsic brilliancy interested him; but he could not follow him into his analogy between the meshes of an incandescent gas-mantle and the dark spaces adjacent to the filament of a tungsten lamp. It was true that a mantle had meshes; but if the fibre was examined under a microscope, it would be found to consist of a rough rope-like structure with many fine fibres projecting into the spaces of the mesh. These fibres got very brilliant, and tended in practice to fill the space with light. Again, it must be remembered that the inside of the mantle was brilliantly incandescent; and this could be seen from the outside through the meshes. This combination of the incandescent interior with the incandescent exterior of the mantle made it practically an incandescent solid, with a boundary coincident with that of the mantle itself. He did not want on this occasion to make any comparison between the gas-mantle and the electric filament lamp, except to point out that the meshes of the mantle were in no way to be compared with the dark spaces between the tungsten filaments.

Mr. A. P. TROTTER said he suggested before the Society some time ago that, when discussing the area of a metallic filament, they must not take a micrometer measurement. They saw by irradiation a filament about ten times the width of the filament itself. It seemed to him that this was what they should take, and not a micrometer measurement of the filament.

Mr. DOW said the effect of contrast upon which Dr. Kerr laid such stress came, to an extent, into almost all lighting problems; and it seemed to him it would be desirable if they could get a complete set of measurements made as to the amount of change in brightness which the eye could perceive with different illuminants with varying backgrounds to them.

Dr. KERR, in the course of his reply to the discussion, said that what had brought them to the present position was the fact that they had now sources of light enormously more brilliant than formerly. When he spoke of 3 foot-candles, he meant that no light should exceed this if acting direct on the eye—that was to say, lights visible to the eye. Even then for household lighting this would be excessive. In the transition from darkness to brightness or from lightness to darkness, adaptation of the eye was rather a slow process. The eye was not adapted to quick changes.

BRICKLAYING IN RELATION TO GAS MAKING.

The Glasgow Corporation Gas Department Foremen's Association brought a successful session to a close on Friday, the 16th inst., when a paper was read by Mr. T. FRASER on "Bricklaying in Relation to Gas Making."

The bricklaying part of a gas undertaking is, the author said, in some quarters looked on as being of rather secondary importance; but, far from being unimportant, it is a most essential part of the gas-making plant. Without well-constructed ovens and retorts, there would be a very poor return from the coal used. Expansion and contraction of the brickwork are the two factors which give the greatest amount of trouble—expansion when working, and contraction when shutting-down. In some instances, allowances are made for expansion by using given thicknesses of wood, which simply burns away as the heat rises; but one can never be certain just how much expansion will take place, owing to the differences in the material used. A remedy, or partial remedy, is to put in the very best material. This, though dearer to begin with, proves to be the most economical in the end. Another, and better, remedy would be to keep the benches working until they practically burn themselves out; but this will only be possible when the demand for gas is the same in summer as in winter. This happy day for the industry seems to be not far distant. For the year ended May, 1916, the consumption of gas in Glasgow was 188,000,000 c.ft. above the previous year; and no one will suggest that it was used in extra lighting.

As things are at present, the bricklayers in gas-works are as migratory as the swallows, in that they go away in the autumn and come back in the spring. Immediately March arrives, the benches of retorts, according to their condition, are shut-down one after the other, as the demand for gas diminishes. After the benches have cooled for a fortnight or so, each retort is carefully examined; and one can then say how many new retorts are required. It is useless to try to estimate the number needed for the repair of a bench during its working time, as the expansion which tends to tighten-up the cracks when the heat is greatest, and the carbon which adheres freely to the sides and top of the inside, give the retort the appearance of being quite good, when in reality it is far from being so. Good-looking retorts (when working) sometimes collapse completely when cooled down. So the shutting-down of fire-clay retorts after six or eight months is bad business, as it entails as much labour, and costs just about as much, as a bench of retorts which has been working continuously for two years or more.

There are at the Dawsholm Gas-Works five, eight, ten, and eleven oven benches, or 184 ovens of horizontals, containing 1736 retorts, with the addition of 144 verticals lately installed. The settings are of the regenerative type. They differ from the usual type of regenerative setting, inasmuch as there is no nostril system of inlet for the producer gases and secondary air; but the producer gases are admitted in a body immediately behind the front 14-inch wall in the centre of the oven, where they spread to both sides, and at this point come in contact with the preheated secondary air. Combustion takes place under and between the side and centre retorts, but all in the front half of the setting, where the temperature may be anything up to 2700° Fahr. The gases then take an upward course to the top of the setting, over a bridge-wall, and down the back half of the oven, where they enter the regenerator to do their work of heating the incoming secondary air, after which they go direct to the chimney through a large main flue provided on top of the bench.

In connection with this main flue, it has often been a source of wonder to the author why some engineer did not come along with an appliance whereby the heat in this flue could be utilized; for in a large works like this, there is as much waste heat going into the chimneys as would do the work of one or two water-boilers. The boiling-point of water is 212° Fahr.; and recent temperatures of the waste gases taken in some of the main flues show that there is as much as 576° Fahr. going into the air, without being applied to any useful purpose, other than making the chimney draw. Each bench of retorts could probably make sufficient steam to supply its own purposes, with the exception of driving engines, where a good pressure is required. Steam is used under the fire-bars of each producer to cool them, and also to prevent the formation of hard clinker. It also forms, with the incandescent coke, hydrogen and carbon monoxide, two combustible gases—the latter the same gas as is formed in the producer by the action of the primary air.

Opinion is much divided on the question of the number and thickness of the cross-walls which carry the retorts; some favouring a large number of thin walls fairly close together, and others preferring thick walls, and only a few of them. In these settings, there are both; as, owing to the fact of combustion taking place in the front half of the ovens, fairly thick, strong walls are necessary. Even with them, if there is such a thing as a defective brick or tile in the construction of these walls, or any carelessness in building by the bricklayers, it spells trouble later on; for the wall will not stand the high temperature to which it is subjected. The building of retort-settings requires more care than the ordinary work of bricklayers, as the beds and cross-joints have to be as thin and close together as possible, otherwise there is shrinkage due to the excess moisture. It is advisable to avoid rough surfaces as much as possible, as the cutting action of the gases will soon cause fusion. All things considered, the bricklayer in a gas-works, to be a success, must be a specialist.

REGISTER OF PATENTS.

Gas Analysis Apparatus.—No. 101,979.

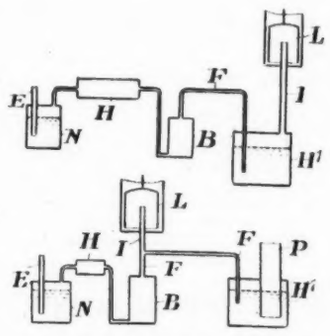
AKTIEBOLAGET INGENIORSFIRMA FRITZ EGNELL, of Stockholm, Sweden.

No. 15,280; Jan. 25, 1916. Convention date, Feb. 6, 1915.

This invention has reference to automatic apparatus for gas analyzing purposes—to make it possible to investigate the percentage of methane in a gas mixture containing same.

It has heretofore been proposed: (*a*) To pass a gaseous mixture through a vessel containing a reagent which absorbs any carbon dioxide in the mixture, then through a heated vessel containing an oxidizing reagent, such as copper oxide, which converts the carbon monoxide in the mixture into an equal volume of carbon dioxide, and then pass the oxidized gas into a carbon dioxide recorder, the record given representing the percentage of carbon monoxide in the original mixture; (*b*) to pass a measured volume of a mixture of gases containing methane through a heated tube containing copper oxide whereby the methane is turned into water and carbon dioxide, the volume of carbon dioxide produced giving a measure of the volume of methane; (*c*) to divide a gas mixture into two streams and pass one stream through a vessel containing an absorbent for carbon dioxide or other gas in the mixture, the percentage of the gas absorbed being measured by a manometer placed between the pipes conveying the two gas streams.

The automatic apparatus constructed according to the present invention comprises an oven containing an oxidizing reagent—for instance, finely divided metal oxide, preferably iron oxide—which, when heated, oxidizes the methane into carbon dioxide, and two measuring receptacles and an absorption vessel, the latter containing a reagent for absorbing carbon dioxide and inserted in combination with the first measuring receptacle, disposed after the oven. By measuring the gas mixture streaming from the oven in the first measuring receptacle, absorbing the carbon dioxide formed in the absorption vessel, and measuring once again in the second measuring receptacle, the difference in the two gas volumes will correspond to the quantity of carbon dioxide formed. As, however, the volume of the carbon dioxide is the same as the volume of the methane before the gas mixture was introduced into the oven, the difference in the two volumes as measured corresponds to the volume of the methane in the original gas mixture.



A Swedish Gas Analysis Apparatus.

Two embodiments of the invention are schematically shown.

E is a pipe through which the mixture is introduced, and N is a receptacle containing an absorbent medium for carbon dioxide—preferably a potash solution. From N the mixture is forced to the oven H, which contains a reagent for oxidizing the methane to carbon dioxide—for instance, a metal oxide, preferably iron oxide, in finely-divided state. The mixture, leaving the oven H, contains no methane, but a volume of carbon dioxide equal to the volume of methane before the gas mixture was introduced in H. B is a first measuring receptacle in which the gas volume is measured. Through the pipe F the gas is pressed or sucked to the absorbing receptacle H¹ containing a medium absorbing the carbon dioxide in the gas mixture, such as a potash solution. The carbon dioxide is absorbed, and the gas mixture is now introduced through the pipe I into the second measuring receptacle L, in which the gas volume is again measured. From L the gas escapes. The difference in the two volumes of the gas when measured in B and in L corresponds to the volume of methane in the gas mixture before it was introduced in the oven H.

The second embodiment of the invention shown differs from the first only in that the second measuring receptacle L is arranged in parallel to the receptacle B as the pipe I branches from the pipe F. The receptacle acts when the pressure in the pipes I F has reached a certain value. In the receptacle H¹, there is in this case inserted a pipe P, so that the liquid can rise in the pipe when the pressure in the system augments.

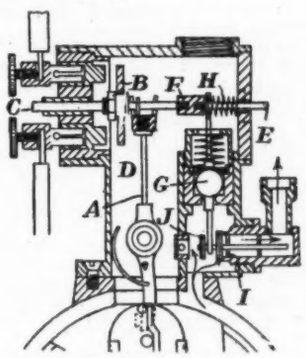
The metal oxide is heated to a temperature of 400° to 1000° C. The most suitable temperature is 800°; and the heating is preferably effected by electrical means.

Actuating Gas-Cocks.—No. 102,249.

FARGE, F. C., of Nice.

No. 5012; April 5, 1916.

According to this invention, a clockwork device for actuating gas-cocks as described in the parent specification [No. 24,223 of 1912] and in specification No. 100,307 is combined with the similar device for actuating electric switches described in the parent specification and in specification No. 100,883.



Farge's Gas-Cock Actuator.

As shown, the arm A, oscillated by the clockwork, is provided with a forked end above, adapted to engage a flange B on a rod C, on which the moving contact D is loosely mounted. A rod E, connected to the rod C by an insulating block F, passes through a hole in the upper end of the ball-jointed oscillating member G. After the switch has been opened, the block F moves the member G against the action of the spring H—to open the main gas-valve I and close the pilot valve J.

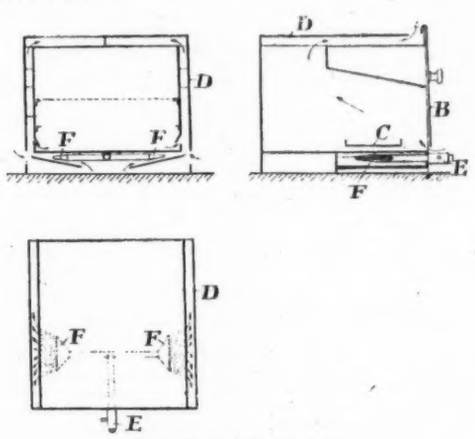
Cooking and Heating by Gas.—No. 103,328.

RICHARD, V. H., of Paris.

No. 1006; Jan. 21, 1916.

One of the main objects of this invention is to arrange that the inside of the oven containing what is to be cooked, in addition to being out of the reach of the combustion gases, is provided with means for automatically establishing a natural draught of air, "for the purpose of constantly renewing, during the cooking operation, the provision of pure air to the jacketed oven."

A cross section, a longitudinal section, and a plan (in section) of the stove are shown.



Richard's Gas Cooking-Stove.

The front face of the oven is closed by a vertical sliding door B, held in its lowermost position by a top hook, while its lower edge is above the level of the hearth, so as to leave a free space for the inlet of air. Two baffle plates are arranged one on each side of the oven within the interval formed between the jacket D and the oven. C is a dish containing the article to be cooked, and above it is a shelf on which dishes or the like may be placed. The jacket D reaches down beneath the hearth, and is formed with air inlets; while its upper wall has an opening for the escape of the products of combustion—provided, if desired, with a chimney (not shown) for conveying away the products into the atmosphere. E is a device for "suitably co-mingling" the air and gas—"of any appropriate system." The combustible mixture as generated is led to one or more burners F,

arranged beneath the hearth—in a chamber to which air is supplied for supporting the combustion of the gas issuing from the burners. The burners are said to assume the tapered shape shown. At the end which connects to the piping they are cylindrical; while at the opposite end, they are flattened down, so as to leave a more or less narrow slit through which the gas can escape—the "gaseous vein being thus converted from a cylindrical into a flat rectangular vein and being directed towards the lower portion of the jacket, at which point it ascends and draws along with it air admitted through the inlets." The combustion continues to take place in the space formed between the jacket and the oven.

During cooking operations, air is admitted into the oven through the space formed beneath the door, and the vapours evolved by the cooking escape along with the products of combustion, "without at any time there being any risk of such products entering the oven."

Gas Ovens or Furnaces.—No. 103,319.

DAVID THOMSON, LIMITED, GALLIMORE, J., and COOK, D., of Edinburgh.

No. 737; Jan. 17, 1916.

This invention has reference particularly to gas-ovens having a multiplicity of burners.

The chief objects of the invention are: (1) To provide means whereby all the burners may be controlled from a central point in such a manner as to maintain a constant pressure on the gas supplied to each burner. (2) To provide means whereby the conditions under which the burners are being employed at any given time can be readily ascertained, and to provide convenient and economical means by which the burners can be lighted. The invention therefore consists broadly in the provision of means whereby the number of burners in use can be readily controlled within certain limits from a central position, in contradistinction to the reduction of the supply and pressure to all the burners.

Further features of the invention are the provision of an igniting burner adapted to light all of a series, and itself be ignited by a single pilot light; and in providing interlocking means whereby the turning-on of the burners cannot occur until after the igniting burner has been lit, and means whereby, when the burners have been lit, the igniting burner can be turned out. There is also an indicator associated with the control valve by means of which the number of burners in use can be readily ascertained at any time.

Charging Mechanism for Gas-Retorts.—No. 103,494.

RITER-CONLEY MANUFACTURING COMPANY, CARPENTER, H. A., and WARNER, A. W., of Leetsdale, Penn., U.S.A.

No. 856; Jan. 19, 1916.

This invention relates more particularly to emergency mechanism for the charger operating mechanism of charging machines used in connection with gas-retorts.

In a prior patent (No. 17,855 of 1912) the inventors described a machine for charging and discharging retorts in which *inter alia* clutch mechanism was provided for transmitting sufficient power to the screw to push the charging and discharging mechanism under all usual and normal conditions; but in the event of the mechanism encountering any obstacle requiring greater power, the clutch mechanism would enable the motor shaft to rotate without affecting the screw. In this earlier construction, if the scoop became stuck the clutch mechanism operated as described, and it was then necessary to withdraw the scoop from the retort by applying a wrench to the end of the shaft.

The present invention is a modification whereby the clutch mechanism and the mechanism for shifting the scoop out of the retort will deal with the problem of withdrawing the charger when it is held against movement in the retort in the manner described. To this end emergency mechanism is provided which, while itself incapable of imparting the normal charging movements to the charger, can be connected with the charger to temporarily exert sufficient force to release the charger when emergency conditions arise, "thereby placing the charger in such condition that it can be operated by its normal power-driving device, such as an electric motor, which can rapidly withdraw it from its position of danger."

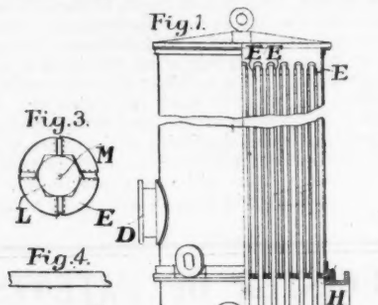
The invention is said to be differentiated from prior emergency mechanism in that the emergency mechanism does not act as a second means for actually withdrawing the charger. In the preferred form of the invention, extremely high power is exerted slowly on the charger to release it from the position in which it is held; and as soon as this has been accomplished, the ordinary driving motor quickly withdraws the charger. Were the charger withdrawn under the action of the emergency mechanism alone, the patentees point out that it would move so exceedingly slowly that the charger would be subjected to the heat action of the retort for so long a time as to destroy it. In the preferred form of the present invention, the emergency mechanism is operated manually; and the necessary high torque is applied to the charger driving mechanism to release the charger through the medium of speed-reducing gearing. The train of speed reducing gearing employed for the purpose is normally out of operative connection with the charger, but is quickly engageable with it, thus enabling the operator to bring the gear train into action, and, preferably, break the motor circuit concurrently therewith.

Combined Gas Cooler and Washer.—No. 103,561.

CHRISTOPHER, J. E., of Hindley.

No. 4487; March 27, 1916.

This apparatus is provided with a series of concentric tubes so arranged in relation to each other that gases passing through the space between the tubes forming each pair or group are divided into thin films and brought into intimate contact with the surfaces of the tubes. The inner tube of each group is cooled by suitable liquid flowing through it, while the outer tube is cooled by sprays from perforations in the inner tube. In addition, the outer surface of the outer tube is kept wet by contact with liquid from the inner tube. The tubes are grouped so that the inlet gases fill the spaces around such units or groups of tubes. In this way, the gases are cooled by contact with the wetted or cooled surfaces of the outer tubes, also by contact with the outer surface of the inner tubes, and finally are washed and cooled by intimate contact with the cooling medium which flows down the sides of the tubes, and in the form of sprays.



Christopher's Combined Gas Cooler and Washer.

Fig. 1 is a part section and part elevation of one form of the invention, and fig. 2 is a half plan and half cross sectional view. Fig. 3 is a plan, and fig. 4 a sectional elevation of certain details.

The apparatus (shown in cylindrical form) contains groups of tubes arranged in pairs of inner tubes and outer tubes in concentric formation. D is the gas inlet to the spaces around the outer tubes. Communication between the inner and outer tubes is provided at E, by means of cap portions L connected to the inner pipes. The gas is thus allowed to pass through the outer tubes and thus come in contact with the outer surfaces of the inner tubes, until it emerges at the openings below, in communication with the gas outlet H. The chamber K is supplied with water or cooling liquid (under pressure) forced up the inner pipes, the lower ends of which are open for the purpose, and emerges to the exterior through a number of apertures along the lengths of the pipes at suitable intervals thereof. The upper portion of the cap L (figs. 3 and 4) takes the form of a nut, provided with an aperture M leading to the exterior of the cap. Some portion of the cooling medium is forced through this aperture into the space around the groups of tubes, and therefore eventually, to some extent, down the sides externally of the outer tubes. The latter result is facilitated by the provision of grooves across the caps, and below the level of the nut portion.

The cooling medium from M, and the tubes cooled thereby, have the effect of washing and cooling the gases in contact therewith, while the sprays from the apertures in the inner pipe have the effect of keeping cool and washing the gases passing between the inner and outer tubes, as well as keeping cool the tubes themselves. After the gases emerge from the lower ends of the tubes, and before leaving the apparatus at H, they are brought in contact with the inner tubes or their extensions.

The patentee claims: A combined gas cooler and washer, consisting primarily of groups of tubes, each group forming a cooling and washing unit, arranged in concentric form; the inner tube of each group being supplied with cooling liquid which, passing through apertures, has the effect of spraying the gas and of forming cooling films about the outer surfaces of an outer tube of each group as well as forming cooling films about the surfaces between the inner tube and outer tube—such films being in direct contact with the gas being cooled and washed.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 21.]

Nos. 2069—2398.

ABRAHAMS, E. G.—"Portable apparatus for producing gaseous fuel." No. 2354.

BERRYMAN, W.—"Flexible bracket for gases." No. 2353.

BURRELL, G. A.—"Gas-analyzing apparatus." No. 2119.

DREWRY, T.—"Illuminating-devices." No. 2286.

HALL, I.—"Melting metals, &c." No. 2314.

ORR, A. J.—"Burners." No. 2265.

PARKER, J. W.—See Abrahams. No. 2354.

REASON, A.—See Orr. No. 2265.

SOCIÉTÉ DU GAZ DE PARIS.—"Gas heating-apparatus." No. 2220.

SOUTH METROPOLITAN GAS COMPANY.—"Anemometers." No. 2383.

SUNDERLAND, L.—"Lighting arrangements of lamp-posts." No. 2140.

THOMAS, J. S. G.—See South Metropolitan Gas Company. No. 2383.

SIXTY YEARS AGO.

From the "Journal" of February, 1857.

A Country Gas Company.—In our advertising columns will be found the announcement of a company which will, we hope, effect much good for the country districts—we mean that announcing the formation of the Country and General Gas Consumers' Company. At the present day, no village, no large mansion even, should be without its gas-works; and the agriculturists would find themselves greatly benefited by this new source of supply of artificial manures. Most heartily, then, do we wish good speed to the enterprising men who have thus undertaken to enlighten "the agricultural mind." Such investments are both safer and better than interoceanic canals across the Isthmus of Darien, or Euphrates Valley schemes, undertaken, as these last seem to be, without proper surveys, and upon the faith of reports in direct contradiction to natural philosophy or to common sense.

Broadbent v. Imperial Gas Company.—We have another of the Lord Chancellor's "patent facts" in the assertion that "120 tons of coals are consumed every day" upon the Fulham Gas-Works. They are consumed! mark that!! *ergo*, the smoke is in proportion, and is "poured out in dense volumes that come down upon the vegetables and fruit trees and flowers in this garden." Yet it had been explained over and over again that the coals were *not* consumed, in any other sense than a baker consumes a sack of flour when he makes it up into quartern loaves, because the gas company does not consume the coals, but merely manufactures them up into coke and gas, which are *consumed* by the public at large; while as regards the "smoke," we very much doubt whether even the consumption of 120 tons of coals could create one-half the dismal obscurity displayed in the Court of Chancery upon this simple question. To distil coals in a closed vessel, by which all the products are collected, and to consume them in a furnace, where everything is dissipated in the air, comes to one and the same thing in the opinion of the Lord Chancellor! who, moreover, "wants no chemists or other scientific people to tell him that that must be injurious!!" He believes that "crystals," consisting of sulphuric acid and *ammoniacal acid* (!), exist in the bark of the plaintiff's trees; and yet he "wants no chemists or scientific people" to teach him the absurdity of his own language.

Coke. By J. O. N. Rutter.—Something should be done to create and to sustain a greater demand for coke. We must no longer be dependent upon the uncertainties of the seasons, the changes in the temperature, or occasional variations in the prices of coal, or the cost of freight. The time was, that a snow-storm, a few days of sharp frost, or two or three weeks of stormy weather or contrary winds, was sufficient to clear out the stocks of coke, however large, from all the gas-works in the kingdom. This system is at an end; partly through the instrumentality of railways, screw-colliers, and a fleet of clippers, and partly because the consumption of coke has not increased so quickly as its production.

Canada's Part in the War, and After.

Far from the least noteworthy event in the noteworthy past two-and-a-half years, has been the magnificent manner in which the Colonies have rallied to the aid of the Mother Country. Thousands of men have come thousands of miles to take part in the fight which has been forced upon us; and thousands more will continue to come, so long as the need for it remains. While fervently hoping that the call for this sacrifice may soon cease, it is true that there is as yet very little to indicate when the war is likely to end; and after it does finish, problems of another kind will urgently demand solution. This is generally realized; and in various directions steps are being taken to meet conditions which seem likely then to arise. So far as Canada is concerned, the matter is to some extent discussed by Mr. Arthur Hewitt (the General Manager of the Consumers' Gas Company of Toronto), in an address, as President, on the past year's work of the Toronto Board of Trade. Whereas for the war the needful things are men, money, and munitions, he points out that after the war the demand will be for men, money, and research. As to men, they must, of course, be of the right class; and a conference was recently held in Ottawa between the Federal and Provincial Governments, for the purpose of planning co-operative action between the British Government and the Overseas Dominions in trying to retain within the Empire all ex-soldiers who may desire to emigrate from the United Kingdom. On the second head, Mr. Hewitt thinks there is not likely to be any great difficulty in securing the money required in connection with the development of the country and its resources. Regarding research, he says that few countries in the world have equal advantage with Canada in the matter of natural resources; and it is most encouraging to find that organized effort is being focussed upon, not only the development of these resources, but the utilizing of them for the general benefit of Canada. What Canada needs is more manufacturers to produce from raw materials obtained in Canada.

Mr. Henry Bilson Blandy, of Wokingham, Berks, the Deputy-Chairman of the Reading Gas Company, who died on Dec. 27, in his 89th year, left estate of the value of £75,912, the net personalty being £55,397.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT)

Visit to the Hamilton Gas-Works.

The members of the Scottish Junior Gas Association (Western District), to the number of about forty, on Saturday paid a visit to the Hamilton Gas-Works. A very pleasant afternoon was spent in going through the various parts of the works; and all were struck with the spic and span appearance of the place, especially the Woodall-Duckham vertical retorts, with their freedom from dust and smoke.

After inspecting the works, the party were entertained by the Hamilton Town Council.

Bailie CASTLES, the Convener of the Gas Committee, formally welcomed the visitors on behalf of the Council. In Hamilton, he remarked, they were always glad to show what they had, and give information, and they likewise were open to receive information. He hoped the party had found the visit worth their while. Personally, he had learned more that afternoon about gas-works than he knew before.

Bailie SLOAN remarked that the gas in Hamilton was among the cheapest in Scotland—being before the war 1s. 10d. per 1000 c.ft., and at present 2s. 3d. per 1000 c.ft. This left them last year with a balance of between £2000 and £3000. They had determined, after persuading the Inland Revenue authorities that they were not liable for excess profits tax, not to reduce the price of gas this year, in view of the uncertainty of conditions which might arise. Whatever might happen, however, they had confidence in their Manager (Mr. Ballantyne) and his Assistant (Mr. D. Robb).

The PRESIDENT (Mr. G. T. Purves), on behalf of the Association, thanked the Town Council, through Bailies Castles and Sloan, for allowing the Association to visit the works, and also for their great kindness in entertaining them.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to the Dundee Tar-Distillation Works.

On Saturday last, the Eastern District of the Scottish Junior Gas Association paid a visit to Dundee, where a tour of inspection was made of the recently-established tar distillation works. Following the visit a paper on the routine at the gas manager's office was read by Mr. R. S. Johnston.

Despite the increased railway fares, there was an attendance of about twenty. The party was shown over the works by Mr. S. Donald, the Manager of the distillation works, and Mr. George Keiller, the Assistant Manager of the gas-works.

After inspecting the works the visitors were entertained to tea in Lamb's Hotel, by Mr. Alexander Yuill.

The PRESIDENT (Mr. J. J. Scott), remarked on the satisfactory attendance, though Dundee meetings, he said, had usually shown twice the number present on this occasion.

Mr. R. S. JOHNSTON then read his paper, as follows:

A RÉSUMÉ OF THE WORK CARRIED OUT IN THE GAS ENGINEER'S OFFICE AT THE DUNDEE GAS-WORKS.

In 1902, the year I entered the employ of the Dundee Gas Department (having just preceded our esteemed chief, Mr. Yuill, by about three months), the staff consisted of three clerks and one boy. Soon after Mr. Yuill's advent, work increased, rapid developments took place, and the office staff had to be added to until in 1914 there were fourteen—nine clerks, two apprentices, and one typist (female) at the works, one clerk in our outdoor distribution office, and one at the Broughty Ferry works. Through the exigencies of war, the *personnel* of the office has been considerably altered. There are now seven men and seven women; but this number will shortly have to be increased.

The following are a few statistics as taken from last year's published accounts at May 15:

Coal carbonized		107,356 tons
Coal gas made	1,136,842,000 c.ft.	—10,533 c.ft. per ton
Carburetted water gas made	32,887,000 c.ft.	
A total of	1,169,729,000 c.ft.	of gas made
Coke and breeze produced	59,537 tons	= 11·09 cwt. per ton of coal
Tar produced	1,256,21 6gallons	= 11·62 gallons ,, ,,
Sulphate of ammonia made	1370 tons	= 28·38 lbs. ,, ,,
Sulphuric acid used	1296 ,,	= 18·9 cwt. of acid to 20 cwt. of sulphate

Tar products sold:

Prepared tar	240 gallons
Light oil	15,129 ,,
Mid oil	64,104 ,,
Creosote oil	326,849 ,,
Pitch	2,494 tons

I will now give you a survey of the operations of our office. The principal books now in use are: The meter and carbonizing books, the general and coal ledgers, the allocation of accounts book, the wages books, the wagon hire book, the daily returns or

goods delivery books—with quite a number of subsidiary books used particularly for statistical purposes and for reference, &c.

METER BOOKS.—There are two of them (for coal gas and carburetted water gas) kept in the station meter house. The attendant records the meter-readings every hour, the amount of gas made, stocks, &c.

CARBONIZING BOOK.—This is kept in the office, and records the meter-readings at 6 a.m. and 6 p.m., the gas made, stocks, &c.; and at the end of each month a summary is entered with comparative statistics for the previous month, period, or year, &c.

WAGES BOOKS.—Formerly there were two books, a scroll wages book on which wages were paid, and then an allocation of wages book containing nearly all the particulars entered in the scroll book, and the analyses of the wages chargeable to the various accounts. In addition to these books, there were weekly wages sheets having each man's name, occupation, number of hours, rate, and amount of wages, which had to be prepared for presentation to, and certification by, the Finance Committee of the Council. Later the scroll wages book and allocation book were combined; but the wages sheets were still in use. About two years ago we introduced the loose-leaf system; and by this means dispensed with the handling of large unwieldy books, also the wages sheets. The clerk in charge of this work has also to make up various sheets of statistics—showing totals of wages allocated to various accounts, cost sheets, &c.

GENERAL (LEDGER.—This book contains a complete record of all accounts except coal) passed for payment. After the invoices and accounts have been duly checked by the order books, the goods received books, &c., the accounts are allocated, initialled by the Engineer, and passed to the Treasurer for payment.

COAL LEDGER.—This book contains the following twelve columns: Dates of invoice and arrival; invoice and actual weights; rate and amount; over and short weight; progressive total and remarks; also the weight carried in the Railway Companies' and Dundee Gas Commissioners' wagons and traders' wagons—these latter for the purpose of checking the 50 p.ct. wagon hire now chargeable on coal carried in traders' wagons.

All coals are weighed over the Commissioners' steelyard just inside the works. Coal advices on receipt are dated and entered into the coal ledger in proper account. They are then checked with the steelyard book—the actual weight being marked down against the advised weight, totalled, and entered into the coal ledger. Totals are made up at the end of each month, and short weights (if any) are deducted. The accounts are then checked and allocated, and passed on to Treasurer.

ALLOCATION OF ACCOUNTS BOOK.—All accounts, having been duly checked, are entered into this book, and the sums apportioned among the various departmental accounts. Each month the totals are carried to a summary, which is made up every three, six, or nine months. The wages for the same period are included in a comparative statement, which is written out along with corresponding figures for the previous year.

WAGON HIRE BOOK.—We have in all a hundred wagons on our coal traffic—fifty owned by the Gas Commissioners, and fifty on hire. A careful record is kept of the earnings; and the totals are made up each month and the charges duly entered in the sales book.

WAGON RUNS BOOK.—This book records the movements of each wagon, and will tell whether the detention takes place *en route* or at the colliery, or if held up in the works.

DAILY RETURN SHEETS AND GOODS DELIVERY BOOK.—As all accounts are rendered to and moneys collected by the Treasurer, it is necessary to furnish him daily with the required data. The various coke delivery books, and other sales books recording the sales of the previous day are extracted and checked with the various order books, for no goods pass out without an order first being obtained. These details are then written out on sheets and passed to the Treasurer each forenoon. Cash sales are sent up each afternoon; so that no moneys are retained at the gas-works over night, except Saturday. At the end of each month comparative statistics are prepared, showing the coal used, and the coke, tar and tar products, and sulphate of ammonia sold. In connection with the sale of coke for the poorer classes, we have for many years sold coke in small quantities (38 lbs. for 2d.) at the gas-works. All ages (but mostly young people) come at all times of the day, pay their 2d., and get a ticket for which they receive the prescribed quantity. In extremely cold weather the number is very large; as many as 400 having been recorded in one day.

COKE DEPÔTS.—About a month ago it was decided to open coke depôts in different parts of the city to supply coke in small quantities to the poorer classes. Three depôts have already been opened. The prices fixed are: ¼ cwt., 3d.; ½ cwt., 6d.; 1 cwt., 1s.—not more than 1 cwt. being sold to one person at a time. The result of this venture, so far as quantities sold, has been satisfactory—financially is another matter. The returns for a month are:

	¼ Cwt.	½ Cwt.	1 Cwt.	Totals. Tons	Cwt.	Qr.
A. Larch Street . .	628	151	16	12	8	2
B. Mid Street . . .	504	138	17	10	12	0
C. Lochee	782	169	30	15	10	0
Totals . . .	1914	458	63	38	10	2

	Tons	Cwt.	Qr.
Equal to . .	9	10	2

STOVE AND METER DEPARTMENT.—On the occasion of the last gas exhibition held in Dundee to inaugurate the giving-out on loan, free of hire, of heating appliances, the demand for gas fires, radiators, cookers, &c., became so great, and so much in excess of all anticipations, that the arrangements formerly in vogue for dealing with these appliances were totally inadequate, and it was at once seen that some new method of handling the orders must be adopted. After careful consideration, it was decided to adopt a card system—one card for each order. The result of their adoption was immediate, and has since been an unqualified success. In order to simplify the work, colored cards are used, all printed, ruled, and numbered: A for complaints; B for cooking appliances; C for exchanges; D for heating appliances; E for removals; F for returns; G for sales. The cards are passed on to the foreman of the stove department for attention. Applications for cookers and heaters are handed to the inspector, who visits the house and enters the necessary data, measurements for piping, particulars of appliance, &c. The cards are returned to the works and the appliances are assembled, addressed, and delivered to their respective destinations, followed by a gas-fitter, who has now got the card, and having fulfilled his part, enters his time, date, &c., and returns it to the foreman, who checks all cards and hands them to the office. Records of the numbers of applications and orders are kept, also of jobs completed, &c. These have proved very useful for reference. The number of cards issued in one year amount to about 9000.

To afford some idea of the success of giving appliances on loan without hire, the following figures may be of interest:

	Cookers.	Hot-plates.	Grillers.	Rings.	Total.
1902 (on hire)	754	—	—	—	754
1906 (on loan).	3,334	392	1,243	815	5,784
1916	14,091	1,711	4,354	9,755	29,911

	Fires.	Radiators.	Geysers.	Total.
1910.	2,168 ..	365 ..	25 ..	2,558
1916.	11,435 ..	1,787 ..	107 ..	13,330

Total free appliances . . 43,241.

METER CARDS.—Before the introduction of these record cards, there were five books or registers in use: (1) Those sent to the Government inspector, (2) given out of gas-works, (3) brought in and tested, (4) faulty meters returned, (5) meters sent to makers for repair. There was no proper system. If one wished to trace a meter, it would sometimes take a man a whole day and more looking through the books. This has now been done away with, as the cards contain the history of every meter from the date of its purchase until it is scrapped. The total numbers of meters in use are: Ordinary, 25,456, automatic, 25,000—total, 50,456.

In our complaints department, we have also cards in use for gas-fitters and inspectors. They have been found to be entirely satisfactory. Here also several books have been dispensed with.

Referring to the wagon steelyard, I find that during the year ending Dec. 31 last about:

12,500 wagons of coal were weighed = over 100,000 tons
12,500 empty wagons were weighed out
2,350 wagons of coke for land sale = ,, 10,000 ,,
4,500 ,, ,, shipment = ,, 20,000 ,,

In addition to these, 800 to 900 tons of sulphate of ammonia, over 1000 tons of acid, and about 1000 tons of bog ore and spent oxide passed over the steelyard. Then, turning to the cart steelyard, over which all coke for town delivery passes, this represents about 21,000 loads, or 25,000 tons, with 200 to 300 tons of sulphate, and all the sundry loads of materials and goods delivered to the works. All this represents an enormous number of entries. The total weight of material passed over the two steelyards amounts to about 200,000 tons annually.

In closing, perhaps you will permit me to say one more word. Is it not the case that junior gas managers devote most, if not the whole, of their time acquiring the technical knowledge necessary to fit them for larger spheres as opportunity offers? It would be to your present and future advantage, however, not only to have a knowledge of book-keeping, but also of business routine. I have one book of special help in this connection—viz., "Pitman's Manual of Business Training," which I can heartily recommend. The following is an excerpt from the introduction to this book: "The greatest successes in the world of business have been won by men who began business life in the humblest capacity, but by the exercise of courage, integrity, industry, and perseverance, have raised themselves to positions which they probably never in their early days dreamed they would occupy. There are two ends to the ladder of success in business; but there is, and ever will be, room at the top for men of the best type, able, adaptable, willing, and, above all, earnest in their desire to achieve distinction in the calling to which they have devoted themselves."

Discussion.

The PRESIDENT opened the discussion by remarking that the paper was more a treatise. There was no gainsaying the fact that, though the best gas manager spent most of his time in the works, he must have a proper system of book-keeping. The old saying was that dividends were made in the retort-house; but it seemed to him that present-day methods compelled the gas manager to devote as much time to system and proper control at his desk. He thought that dividends were as much made there as anywhere else. Without such a system and proper statistics, it was impossible to find out at any time exactly how one was progressing as compared with previous years. It was very haphazard if one had to wait till the end of the financial year to learn how things were moving. What was done in Dundee in these

matters must, he thought, be of first-class order. The figures given in the paper were surprising, but not so very surprising when they took into account the vitality of Mr. Yuill, who had brought affairs in Dundee to such a high standard. The author, in touching upon the card system, had shown how adaptable it was to every other class of work. He maintained that it was a very good thing for every man to go thoroughly into statistics. They enabled him to understand every item of his business, and provided him with a steady reference right through the year. From all points of view, statistics very invaluable and well worth the trouble spent in obtaining them.

Mr. ALEXANDER YUILL, in response to an appeal by the Chairman, made a few remarks. He wished to give Mr. Johnston full credit for having placed the paper before them, because it would be of great advantage to them all. He would like to impress upon them the great importance of statistics, for it was only by comparison, not only with themselves but with others, that they sometimes learned for the first time that they were not doing so well as they thought; and it ought to be within them all to do as much as they possibly could to get to the top. There was another point—the great benefit there was at the present day in a good commercial understanding of the position. They had to devote a considerable part of their time to the mechanical and technical part of their work; but unless they were able to combine the technical side with the commercial side, they would never bring any undertaking to the success it warranted.

Mr. JAMES MITCHELL (Montrose) said he spoke as an old pupil of Mr. Yuill. In Montrose, they had recently changed their gas office; and during this period had had an opportunity of seeing the practical value of several of the methods which Mr. Johnston described. Speaking of the Dundee Gas-Works, he said that one thing he had always admired about them was that there was no plant standing idle—no old plant, no scrap. Nothing was installed without reason, and everything was of the best. With regard to the development of the Montrose Gas-Works, he might say that, thanks to the distribution of 550 free cookers and other appliances, they had increased their output of gas by approximately 50 p.ct. Many gas managers were against free cookers. He could not say why. They brought in their return.

Mr. JOHNSTON, in reply to a question by Mr. Air, of Crossgates, said, with reference to the card system that he had described, it was a case of different colours of cards for different classes of work. Each card was for one job only. When an order was received, a card was written out with the name, address, and complaint upon it. It was then handed to the fitter, who went to the job. He filled in the particulars of the work, time, &c., and handed it back to the foreman. If it were an application card, the inspector filled it up, put in the necessary measurements, and then it was returned to the office.

VOTES OF THANKS.

The PRESIDENT, in moving votes of thanks, said that Mr. Yuill had kindly presented the Association with copies of the various papers, forms, and cards referred to in the paper. Any member who wanted them for perusal and assistance could obtain them from the Secretary. They could be circulated in turn among the members who wanted to see them. He desired to thank Mr. Yuill for this favour, and also for the enjoyable way he had entertained the Association—first in having them at the works, and then for his kind hospitality at the tea table. Mr. Yuill had always been kindly disposed towards the Association; and he (the President) wished to take this opportunity of expressing his thanks to him for the way he had received them. They had also to thank Mr. Donald, Mr. Keiller, and Mr. Johnston.

Trade Wastes.

Some excellent examples of the striking results that sometimes accrue from looking well after what may on first consideration appear to be comparatively unimportant, were given in a communication which Mr. R. D. West read a week ago before the Junior Institution of Engineers. What was done in the paper was to describe some modern improvements in dealing with trade wastes; and the justification for drawing attention to it is the author's own admission that the subject is one with which the generality of engineers are not conversant. This is, he thinks, due, on the one hand, to the special nature of the work, and, on the other, to the fact that these methods have not been advertised to the world at large. As a matter of fact, our own industry was the first to be mentioned by Mr. West, who, however, stated that he did not propose to deal in any way with the problems or methods of recovery of the bye-products resulting from the wastes of gas-works, as these, in themselves, would provide sufficient subject-matter for a long and interesting paper. But the systems to which he confined his attention enabled the quoting of some very big money figures, with which engineers and chemists have good reason to feel well satisfied. First, there was the recovery of glycerine and salt in soap making, by a patent process, which has now been fitted to the great majority of the works in this and other countries; next the recovery of the waste caustic soda used in mercerizing and in paper-making; and so on. The final process described—for the first time in public—was for the extraction (with a solvent) of oil from various materials. The most modern plant for this purpose carries out two operations—the extraction of the oil, and the simultaneous recovery (in another part of the same apparatus) of the oil and the solvent.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The "Work" of the Institution.

SIR,—For the third year in succession the Institution of Gas Engineers, as represented by the collective wisdom of its Council, have determined that the ordinary routine of its annual meeting shall be again curtailed, and the verbal expression of the collective wisdom of its members shall be again censored, to the extent of total extinction on the many matters of such fascinating interest as have come into existence, due to the stress of war. Let us hope that the Council have not been prompted by the thought that the less said about gas at present the better.

It is true that, through the instrumentality of a beneficent dispensation, we have been relieved of the necessity of working to our statutory obligations; and this in itself has enabled those in charge of gas undertakings to investigate factors which were beyond our reach hitherto and are not likely to again arise.

An enormous variety of experience has been gained as a consequence of this relief; and to me it seems a regrettable loss that such matters cannot be freely discussed while there is yet time and opportunity to make further investigations.

Gas practice and the results arising with regard to "stripping" seem to vary materially; and it would have been highly interesting to have discussed, in relation to coke-oven practice, the different points of view in gas-works practice.

In some cases we know adulteration is the order of the day—even to the extent of 20 p.ct. of non-combustibles. In other cases, dilution by means of blue water gas is largely practised, the primary object of both being an increased yield of gas per ton of coal. The effect of these practices upon the yield of benzol, &c., is a matter of almost national importance to determine; for, obviously, if the gas is depreciated in value in the process of manufacture before washing, the yield of products by washing must necessarily be less.

Perhaps we should be thankful that the industry was not called upon to produce a higher initial quality of gas when the order for the extraction of benzol, &c., first came out, and thus ensure an immediate return of a larger quantity of these essential products.

I have no doubt the industry would have responded even to such a call; but why some undertakings have been allowed to largely increase their yield of gas per ton of coal under the beneficent orders issued by the higher authorities, is again a subject that could have been thrashed-out had the meetings of the Institution been held.

These by no means exhaust the field that might profitably have been traversed; and the influences of such practices upon the quality of the product sold could have been determined.

Even to-day there is a large number of men who believe that the candle power is no indication of the calorific value of a town's gas, whereas the records of the London County Council testings show conclusively that such an impression is wrong.

How interesting it would be to compile records of the calorific value of the gas in the few works where calorimeters existed (say) in 1910—prior to the introduction of the standard burner—and the calorific value of what is being supplied to-day.

It is quite true that the candle value as a test basis has for years past been unfair and unjust to the industry and, since the introduction of the incandescent burner, an absurdity, as it determines the value of the gas by means that are beyond the reach of the consumer, and in a manner that nobody dreams of burning it to-day. The calorific standard is, however, a more scientific and certain basis of valuation; and the only point at issue is its degree.

Here, again, an open discussion would have disclosed the opinions of many men who have now practical experience in supplying gas of a quality very much below what the wildest imagination would have thought permissible in pre-war times; and, arising out of this, many points vital to the future of the industry emerge.

A lower initial value may involve a larger initial volume to be supplied, with its consequent effect upon the distributory system and upon the piping in consumers' premises. It has involved adjustments of all appliances now used relying upon the bunsen burner, and may even go so far as to necessitate an enlargement of the flue exit from all gas apparatus—a point which my own experience suggests will be necessary, particularly where there is a large volume of non-combustible gas in the supply.

Why should we continue adulteration when we have within our reach such simple plant as water-gas apparatus, which yields both volume and heat value uncarburetted of 300 B.Th.U. There are some such plants that claim to be able to carburet sufficiently to considerably increase this value by the use of small quantities of clarified tar.

Obviously, our duty is to yield the highest number of heat units in the form of gas per ton of coal or coke used; and the way to do this economically is to avoid the introduction of non combustible matter. There are several undertakings following this practice at the present time; and the experience of those engaging in it should be the purpose of the Institution to bring out.

It is an enticing subject; for it holds out the prospect of our dispensing with from 25 to 33 p.ct. of our present coal supplies, and still yielding a gas of 500 B.Th.U. standard. But its success pre-supposes the abandonment of the practice of over-exhaustion, with the consequent addition of large volumes of non-combustibles.

The Institution has not, in my view, in the past taken a sufficiently definite line in determining the policy which should be followed in gas practice. Why should not set debates be organized on vital points of policy such as have occurred in the past, are dominant now, and will occur in the future; so that the opinions of all can be voiced, not through a discussion on a paper (when there is generally limited time), but as an open debate when, if necessary, a vote of the meeting could be recorded, and the Council, backed with this vote, could face any

Department of the Government with an authoritative opinion from the only body of men who are really capable of expressing an opinion.

There never was a time when there were so many matters of vital importance ready for exhaustive consideration and discussion; and yet, for some inexplicable reason, the Institution continues to lie dormant, and allow these golden opportunities to pass.

W. R. HERRING.

Palace Chambers, Westminster, S.W.,
Feb. 22, 1917.

Mr. Adam's Article on "Oil-Washing for Benzene and Toluene."

SIR,—I would like to point out a slight printer's error on p. 343 of the last number of the "JOURNAL." In the last paragraph but two, the percentage of tar acids in the fluid creosote is stated to be "2," whereas it should read "25."

W. G. ADAM.

Tar and Ammonia Products Works,
Beckton, Feb. 22, 1917.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills.

Bills Read a Second Time.

Bills read the second time and committed:
Haslemere and District, Hemel Hempsted, Kenilworth, Lea Bridge District, and South Staffordshire Mond Gas.

Petitions.

Petitions have been presented against the following Bills:
Haslemere and District, by the Haslemere Urban and Hambledon and Midhurst Rural District Council; the London and South-Western Railway Company; and the Alton Rural District Council.
Hemel Hempsted, by the Midland Railway Company; and the London and North-Western Railway Company.
Kenilworth, by the London and North-Western Railway Company.

HOUSE OF COMMONS.

Bills Read a Second Time.

The following Bill was read a second time and committed: Blackpool Improvement.
Bills read a second time, and referred to the Examiners: Gas Light and Coke Company, Sheffield Gas Company.

State Control of Coal Mines.

Mr. DUNCAN MILLAR, on Monday last week, asked the Prime Minister whether he could state what financial and other arrangements had been made for the transfer of the coal mines in the United Kingdom to the State, and for their control by the new Controller of Mines; and what changes (if any) would be made in the position of the miners and in their present rates of pay under the new scheme.

Mr. ROBERTS: I am not yet in a position to make any statement on the arrangements which the Controller of Coal Mines will propose. I recognize the desirability of an early statement; but, having regard to the recent appointment of the Controller, I do not think it is unreasonable to ask for further consideration.

[It has since been announced that the Board of Trade have made an order under the Defence of the Realm Regulation No. 9G, taking possession as from March 1 of all coal mines in the United Kingdom, other than those in South Wales and Monmouthshire, of which possession was taken on Dec. 1 last.—ED. "G.J."]

Street Explosion at Preston.—There was an explosion last Sunday week in Madow Street, Preston, where the gas-mains and electric cables run side by side. A quantity of paving was dislodged, and at one point the gas escaping from the main became ignited. Fortunately, no personal injuries resulted from the occurrence.

Vertical Retorts at Elland.—It is stated in the annual report of the Directors of the Elland-cum-Greetland Gas Company that during the past year the new vertical retort installation has been completed, the cost of which amounted to £9999. Of this, £6000 is chargeable to renewal account, and £3999 to capital account. Of the £6000, £1500 has already been charged in this year's renewal account. The balance (£4500) has been placed to a suspense account, with the intention of it being written off during the next three or four years. The profit, including the balance brought from last year, amounts to £9861. An interim dividend at the rate of 5 p.ct. was paid for the June half year on the converted ordinary and the new ordinary stock, absorbing (with the dividend on the preference stock, income-tax for the year, and interest on the loan capital) £3859, leaving a balance of £6002 now available for dividend. The Directors recommend that, out of this sum, after paying the dividend on the preference stock, and the maximum dividend on the new ordinary 5 p.ct. stock, the statutory dividend on the converted ordinary stock be paid, which, together with the interim dividend, will make a dividend for the year of 7 p.ct.

LEGAL INTELLIGENCE.

DEPENDANT'S ACTION FOR ALLEGED NEGLIGENCE.

HIGH COURT OF JUSTICE.—KING'S BENCH DIVISION.

Tuesday, Feb. 20.

(*Before Mr.* JUSTICE HORRIDGE *and a* COMMON JURY.)

Henderson v. Gas Light and Coke Company.

In this case, Elizabeth Henderson, the executrix of Thomas Taylor Henderson, sought to recover damages for her own benefit as the sole dependant of her husband, who died on April 23, 1915, from injuries sustained owing to the alleged negligence of defendants. Henderson was chief engineer of the s.s. *Hebburn*, which was at the date in question lying at the defendant Company's jetty at Beckton. It was alleged that defendants had the general management and control of the wharf or quay, and that it was their duty, by virtue of a regulation made by the Secretary of State under the Factory and Workshops Act, 1901, securely to fence dangerous parts of the edges of the wharf, and to sufficiently light all dangerous parts of the road over the wharf. The means of access provided by defendants comprised a step ladder without any fencing or protection at the side, so placed that its slope or inclination varied as the tide rose or fell, and that the place was not properly lighted to allow of its being used with safety after nightfall. Deceased, while proceeding from the shore to the ship, at about 10 p.m. on April 23, fell from the ladder and sustained injuries from which he died. Defendants denied that they had control of the quay, or that the ladder was dangerous, and contended that death was not occasioned through any negligence on their part or failure to comply with the regulations under the Factory Act. They further said that deceased was not using the ladder at their invitation, and that, if he was using the ladder, it did not expose him to any unusual danger. Moreover, the danger, if any, was well known to deceased.

Mr. COMPSTON, K.C., and Mr. SIMEY appeared for the plaintiff; Mr. HOLMAN GREGORY, K.C., and Mr. WM. SHAKESPEARE represented the defendants.

Plaintiff stated that her husband's wages were £20 a month, out of which she received about £200 a year.

Mr. *Dalglish*, an engineer, who had made a model of the *locus in quo*, said he did not consider a ladder a safe means of access to the ship if it was at anything like an angle of 40°. To make such a ladder safe it should not exceed 16° to 20°. To make access absolutely safe a different kind of gangway should have been erected (a model of which he produced), the cost of which would be from £16 to £20.

In cross-examination, witness said with his gangway at low tide the angle would be from 26° to 30°, which he did not consider dangerous. When the angle got over 30° it began to get unsteady. He did not suggest that the ladder which was in use at the time of the accident had any side movement.

Wednesday, Feb. 21.

John Ryott, who was with Henderson on the night of the accident, said there was a watchman on the quay who told them to be careful of the ladder. The ladder was at an angle of about 45°. As Henderson was falling witness tried to catch hold of him, but he slipped out of his grasp and fell on the pontoon below. Witness descended and found him insensible. He was taken to the hospital, and died shortly afterwards.

In cross examination, witness had only been at the pier twice. He could not say how many times Henderson had been there. It was fairly light at the time. The ladder was quite sound, and in its proper place. He did not feel any motion on the ladder. He had no difficulty in getting down. Henderson was about 3 ft. down the ladder when he fell. Witness thought Henderson did not get his boot far enough through the rung, and his foot slipped.

This was the case for plaintiff.

Mr. *B. R. Barber*, pier master at Beckton, described the construction of the pontoon. There was not the slightest side movement; the ladder being extra strong and made specially for the purpose. About fifty ships a month were discharged at the pontoon; and the ladder was used day and night by the crews.

In cross-examination, witness said that a gangway such as described by Mr. Dalglish could not be used.

Mr. *Thomas Goulden*, the Chief Engineer of the Gas Company, said, looking at the photograph produced at the inquest, he should say the angle of the ladder was 30° from the perpendicular. Such an angle would be reasonably safe. The pontoon was erected in 1906, after an accident had occurred in 1905. After very careful consideration, the present plan was adopted. About 1¾ million tons of coal were unloaded at Beckton each year, which meant 700 ships, with from twenty to forty men on each.

Wm. H. Peppit said he was on duty on the night of the accident He moved the foot of the ladder according to the state of the tide, The accident happened about half an hour after the ladder had been moved.

Mr. *Paul Percy Fielding*, Superintendent of W. Cory and Sons, said as a practical man he preferred a ladder to a sloping way, as the heel of the boot was liable to catch in the treads of the way, especially in wet or frosty weather.

John T. Stratford, foreman to Messrs. Samuel Williams, lightermen, said that a similar arrangement to that at Beckton could be seen at the Albert Dock jetty. He agreed with the last witness.

Mr. SHAKESPEARE, on behalf of defendants, expressed their sincere regret at the unfortunate accident which had occurred. The only question for the Jury was: Had defendants been wanting in care towards a person who came to their premises on lawful business? He submitted that they had taken every possible care, although it was not his duty to satisfy the Jury of this fact, but rather for plaintiff to prove that they had not done so. The method now in use had been adopted

at enormous expense to the Company, after taking the advice of experts. He submitted that there was no evidence of negligence, and that defendants were entitled to a verdict.

His LORDSHIP left three questions to the Jury: (1) Was the arrangement at the time of the accident reasonably safe for persons using it? (2) If unsafe, was its unsafety the cause of the accident? (3) Damages.

The Jury answered the first question in the affirmative. Therefore the other question did not arise.

His LORDSHIP entered the verdict and judgment for defendants.

DECISION IN THE GASCOLITE "EXPLOSION" CASE.

The Coatbridge Gas Company Assoilzied.

The case in which a young woman named Agnes M'Laren sued the Coatbridge Gas Company for £20 damages for injury to her eyes and face by the alleged explosion of a tin of "Gascolite" which she was opening, and which she had bought at the defenders' show-rooms, was decided, after avizandum, last Tuesday. The two previous hearings were reported in the "JOURNAL" for the 6th and the 20th inst., pp. 259, 359.

Sheriff LEE, in giving his decision, said: This is an action in which pursuer claimed damages for injury to her eyes. She averred that when opening a tin of "Clark's Gascolite," sold to her by defenders, an explosion occurred causing serious injury to her eyes. The fault alleged against the defenders was that, while they advertised and sold the preparation for removing burnt grease from stoves, they gave no directions as to how to open the tin safely. The case was debated at the first calling on the relevancy; and I allowed proof with reluctance and hesitancy on the assurance of pursuer's Agent that he was prepared to prove: (1) That the accident was really due to the explosive nature of the contents of the tin, and to an explosion on the scale of a gunpowder explosion—an explosion due to, and resulting in, the chemical nature of the substance; and (2) that the pursuer's purchase of the tin was induced by the defenders' recommendation of it as suitable for the purpose for which she designed to use it. Neither proposition was established, and, indeed, no evidence was led to support either of them. The pursuer was in the defenders' premises for some other purpose; and seeing the maker's advertisement of this preparation, she bought a tin, relying on the advertisement and without consulting the defenders. "Gascolite" is made in Reading, and retailed all over the country, and, for all that the defenders knew, the pursuer might have known more about it than they did. They neither knew the purpose for which she bought it, nor recommended nor guaranteed its use. The advertisement which attracted the pursuer also intimated to her that it was not a preparation of the defenders. The tin was of the kind familiar to most people as toffee tins or paint tins, in which there is a closely fitting lid which could be prised open and replaced by pursuer. Such tins notoriously and obviously must be opened with some care, to prevent the lid flying off unexpectedly and with considerable force. The pursuer proceeded to open it by placing it upon a window sill and using a pair of scissors as a lever. The lid flew off into her face and broke her spectacles into one of her eyes, causing injury to the eyeball. At the same time, some of the contents—a crude caustic jelly—spurted up and burned her eyes and face. It is easy to understand how this unfortunate accident might happen, without any explosion, merely by the sudden coming away of the lid and the unsteady handling of the tin under the spurt caused by the violent flying off of the lid. It is enough that pursuer has offered no evidence that the lid was blown off and the contents blown out by the nature, or change of nature, of the compound; but there was evidence on the other side that nothing of the sort was possible. Experiment and analysis had shown that the substance was not capable of either explosion or ignition. As the result of the proof, I must find that the accident to the pursuer was not due to any fault on the part of the defenders. They did not guarantee either the tin or the contents, or assume any liability for the pursuer's use of either. Further, the accident was not the result of any defect or danger in the tin not clearly obvious, or of any dangerous property of the contents which ought to have been disclosed, to put purchasers on their guard.

His LORDSHIP assoilzied the defenders, and awarded them expenses.

A Temporary Breakdown at Lytham.—An accident at the Lytham Gas-Works recently caused a temporary shortage of gas. It is stated that the breakdown was caused by the bursting of a water-pipe in the gasholder; and there was nothing to indicate the leakage until the water submerged the main gas-outlet. Pumps were, however, then got to work, the men standing knee-deep in the water; and fresh piping was fixed as promptly as possible.

South Shields Gas Company.—The Directors report that the revenue for the year ended Dec. 31 amounted to £105,388, and the expenditure to £92,222, leaving a profit of £13,166. Adding a proposed transfer from the insurance fund for extraordinary charges due to the war (£5000), and the balance from the previous year (£20,868), the total sum available is £39,034. Out of this it is proposed to pay a dividend of 8 p.ct. per annum on the consolidated and new stocks and of 5½ p.ct. per annum on the ordinary stock—both less income-tax. After paying interest on the mortgages, &c., there will be a balance to carry forward of £20,095. Notwithstanding an increase in the quantity of gas used for industrial purposes and gas-fires, there is a net decrease in consumption of 6·22 p.ct., due to the abolishment of public lighting and restricted general lighting consequent on the war. Coal has cost much more; but residuals have yielded more than in the previous year. Prices of all materials have again advanced; and wages have had to be further increased by additional war bonuses. Female labour has been introduced wherever possible to liberate men. The price of gas was increased from Jan. 1 by a further 2d. per 1000 c.ft., making 4d. increase since the commencement of the war.

MISCELLANEOUS NEWS.

LIVERPOOL GAS COMPANY.

The Annual Meeting of the Company was held in the Offices, Duke Street, Liverpool, last Tuesday—Mr. H. WADE DEACON, J.P. (the Chairman), presiding.

The report stated that the total revenue for the year ended Dec. 31 was £879,490, and the expenditure £754,774, leaving a surplus of £124,716. After deducting the amount taken for payment of the dividend declared last August, and the interest on the debenture stock and mortgages, there remained a balance of £98,038, out of which the Directors recommended a dividend for the past half year of 2½ p.ct. on the ordinary stock.

The accounts showed that the total capital paid up and added on conversion at Dec. 31 was £2,498,905, out of £3,098,905 authorized. The amount raised on loan at the same date, including premiums, was £486,218, out of the £750,222 authorized. The capital account indicated that in the course of the year £6907 was spent on new buildings and plant, mains and service-pipes, meters, fires, and water-heaters; while £8208 was written-off for depreciation, &c. The reserve fund stood at £132,117; the special purposes fund account at £17,015; and the co-partnership bonus and savings at £24,805.

REVENUE ACCOUNT.—*Income.*

	£ s. d.	£ s. d.
Sale of gas—		
Per ordinary meters at 2s. 3d. per 1000 cubic feet	431,126 15 8	
Per automatic meters at 2s. 10d. per 1000 cubic feet	211,269 5 5	
Public lighting at 2s. 0·3d. per 1000 cubic feet	8,851 3 2	
		651,247 4 3
Rental of meters	12,653 17 5	
,, fires and cookers	13,901 8 9	
Residual products—		26,555 6 2
Coke (*Less* expenses)	119,310 0 8	
Tar ,, ,,	21,694 16 3	
Ammoniacal liquor ,, ,,	47,991 16 9	
Other products ,, ,,	11,783 6 5	200,780 0 1
Rents		100 0 0
Fittings		807 14 6
		879,490 5 0

REVENUE ACCOUNT.—*Expenditure.*

	£ s. d.	£ s. d.
Manufacture of gas—		
Coals, including oil, dues, carriage, unloading, and all expenses of depositing same on works	444,882 9 9	
Purifying materials, water, and sundries	13,465 3 3	
Salaries of Engineers and Superintendents and officers at works	9,320 4 3	
Wages and gratuities at works	66,885 15 4	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials and labour, *less* old materials	77,697 6 3	
		612,250 18 10
Distribution of gas—		
Salaries of Surveyors, Chief Inspector, Inspectors, Assistant Inspectors, &c.	18,385 17 4	
Repair, maintenance, and renewal of mains and service pipes, including materials, laying, paving, and labour	12,999 0 10	
Repairing, renewing, & refixing meters	17,591 12 9	
,, ,, ,, fires and cookers	10,788 2 5	
		59,764 13 4
Public lamps—		
Lighting and repairing	..	1,609 9 11
Rates, taxes, and rents—		
Rents	604 16 2	
Rates and Taxes	34,273 5 11	
		34,878 2 1
Management—		
Directors' allowances	2,000 0 0	
Salaries of Secretary, Accountant, and clerks, office keepers, and messengers	10,157 12 9	
Collectors' commission and salaries	8,218 16 8	
Printing, stationery, and advertising	2,731 16 6	
General establishment charges and incidentals	3,641 15 8	
Auditors	441 0 0	
		27,191 1 7
Special charges—		
Law and parliamentary charges	233 2 10	
Contributions to officials' superannuation fund	3,009 6 9	
Moiety of superannuation to old officials	2,554 10 6	
Co-partnership bonus	8,924 14 10	
Bad debts	417 3 3	
Insurances and compensations	3,941 6 9	
		19,080 4 11
		754,774 10 8
Balance carried to net revenue account		124,715 14 4
		879,490 5 0

Statement of Residual Products.

Description.	In Store Dec. 31, 1915.	Made (Estimated).	Used in Manufacture (Estimated).	Sold.	In Store Dec. 31, 1916 (Estimated).
Coke—tons	610	213,472	48,183	157,991	7,908
Tar—gallons	465,118	4,164,549	179,041	4,103,250	347,376
Ammoniacal liquor—gallons	487,940	9,805,408	*Nil*	9,874,872	418,476

Statement of Coal and Oil.

Description.	In Store Dec. 31, 1915.	Received.	Carbonized or Used.	In Store Dec. 31, 1916.
	Tons.	Tons.	Tons.	Tons.
Common	37,867	311,846	296,682	53,031
Cannel	1,613	31,963	31,736	1,840
Total . .	39,480	343,809	328,418	54,871
Gas oil—gallons . .	716,112	4,500,264	3,098,987	2,117,389

The CHAIRMAN said the year had been one of unprecedented difficulty. Not only were there higher prices for all commodities, especially oil, but there was a shortage of labour; 518 of the Company's men having joined the Colours. It had not been an easy task to fill their places. They had now 111 women in their employ, as compared with none two years ago. At the request of the Government, the Company had been extracting toluol and benzol from the gas; this being a disadvantage to the Company but a national duty, which was about to be extended. The results of the year's working, while by no means such as would have been attained in normal times of peace, had not been unsatisfactory. Although the price was raised to 2s. 3d. per 1000 c.ft. in January, 1916, the income from the sales of gas was larger only by £17,920. Owing to the restriction of lighting, early closing of public-houses and shops, the effect of the Daylight Saving Act, and general private economy, the quantity of gas sold had decreased by 4·76 p.ct. The income from residual products showed an increase of £47,110. There was an increased demand for coke, and the yield from ammonia was higher; but the amount obtained from tar had fallen. The total income for the year was £879,490, an increase of £65,611. The cost of manufacture of gas had increased by £102,989; the cost of oil alone having been £98,391 higher. The expense of distribution was reduced by £16,349, less work having been done, especially in connection with the supply of gas stoves and fires. The Government would not sanction the raising of the capital necessary for the extension of this work; and the Company, therefore, were compelled to discontinue the letting out of fires on the simple hire plan—a valuable source of revenue thus being lost. The use of raw coal in open fires, to which England was so much wedded, was undoubtedly wasteful, especially at present, when products of vital importance for the production of explosives, instead of being extracted in the gas-works, were destroyed or sent up the domestic chimneys. The total expenditure was £754,774, an increase of £81,382; there being £124,716 to carry to net revenue account. It had been necessary to increase the price of gas; and it might become imperative to increase meter-rents, owing to the greater cost of renewals.

Mr. J. E. TINNE (the Deputy-Chairman) ascribed to the Chairman's sagacity, foresight, ability, and courtesy the happy position of the Company, and the friendly relations with the staff and workmen.

The adoption of the report, the declaration of the standard rate of dividend, and the re-election of the retiring Directors were agreed to without discussion.

SOUTH SUBURBAN GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Friday, at the Cannon Street Hotel, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

THE DIFFICULTIES OF WAR TIME.

The CHAIRMAN, in moving the adoption of the report and accounts, said: This is the sixth occasion on which it has been my privilege to address you since the Company became involved in the consequences arising from the outbreak of war; and almost invariably fresh difficulties have had to be reported, although these have not been wholly without compensations. At the present time, there is considerable uncertainty as to the future supply of coal, which, as you are doubtless aware, has now passed into the hands of the Government; and I may take this opportunity of expressing our appreciation of the way in which the Company's contractors have maintained their deliveries throughout the winter, under very difficult conditions as to transport. But our chief anxiety at the present time is as to supply of labour, consequent upon the withdrawal of large and constantly increasing numbers of the Company's employees to join the Colours, and the practical impossibility of finding substitutes for them. This has recently been accentuated by very heavy increases in the demand for gas, which have necessitated the re-starting of the Bromley works. But fortunately female labour has come forward to a very gratifying extent, and is now somewhat largely employed on both works and district, with, it may be added, very satisfactory results.

FINANCIAL RESULTS—INEVITABLE CAPITAL EXPENDITURE.

It is apparent from the accounts that, as against the corresponding figures of the previous year, a moderate reduction in the cost of coal and oil—taking tonnage as the basis—has been counterbalanced by heavier cost of works maintenance, and war bonus and allowances. So that, notwithstanding a reduction of distribution charges, owing mainly to inability to carry out work that ought to have been done, and although helped on the credit side of the account by substantial increases—amounting to £10,751 and £3432—in the receipts for gas and residuals respectively, the net effect of the half year's trading, after making provision for interest charges and dividend at the statutory rate of £4 16s. 8d. p.ct. per annum, is just an increase of £916 in the amount to be carried forward to the next half year. Accompanying, however, this evidence of by no means overweening prosperity, is an expenditure on capital account of £8622—not by any means a large sum when considered in relation to the increase of gas consumption; but showing that the financial resources of the undertaking have been drawn upon to an appreciable extent at a time when it is not possible to issue further capital, except upon very onerous terms. It may then be asked, Why, under existing circumstances, should this liability be incurred? The answer is that, while the Directors keep a very jealous eye upon all capital expenditure, especially at the present time, so long as there are new consumers to supply, money has to be spent for their equipment. There were no fewer than 1548 of these to be provided for during the half year, many of them being munition workers; and we feel sure the proprietors would not desire that too narrow a view should be taken of the Company's obligations, especially where these are concerned.

A PROSPECTIVE FURTHER INCREASE IN PRICE.

The continued upward tendency in the cost of both labour and materials—that of gas oil, for example, has now been quadrupled since 1914—suggests that a further increase in the price of gas may before long become necessary, in which case the satisfaction will at least remain to us of having, by our action last year in securing Midland coal, succeeded in staving-off such increase for a time.

HEATING APPLIANCES AND LARGE DAILY FLUCTUATIONS IN GAS DEMAND.

The demand for heating and cooking appliances—and more particularly for gas-fires—exceeded all previous experience; and the total number of these appliances now on hire has reached the exceptionally high average of nearly 106, or, to be exact, 105·7 per 100 consumers. It is quite certain that they have largely contributed to the substantial increase of 6·13 per cent. in the gas sales for the half year—notwithstanding lighting restrictions, Summer Time Act, and the general practice of economy. But, large as was this output, it has been very greatly exceeded in the last few weeks. During one fortnight alone—covering, it is true, what was probably the lowest temperature period—the daily increase varied from 30·4 to 59·7 per cent., the average for the whole fourteen days being 41·5 per cent. over the corresponding period of last year. This means that, almost without warning, and in what was very nearly mid-winter, when manufacturing resources are generally taxed to the utmost, the undertaking was called upon to supply—not on one occasion only, but for a whole fortnight—over 40 per cent. more gas than usually suffices at that time of the year, under ordinary conditions. I feel sure you will agree that the maintenance of the supply under such conditions reflects the highest credit upon all connected with the management, from the Engineer downwards. It may be mentioned that, throughout the whole of the recent inclement weather, from its commencement early in the year until its termination about ten days ago, the usual supply of gas was fully maintained, except on one occasion when a mishap, caused by the frost at its extremity of 9° to 10° Fahr., necessitated a partial withdrawal for two, or at most, three days. Our acknowledgments are due to consumers who may have been put to temporary inconvenience by this occurrence, for the forbearance they kindly exercised. It may be added that the increased output from Jan. 1 down to the present time is over 112 millions, or 28·2 p.ct. This is quite encouraging from one point of view; but it raises the important question as to whether, under present conditions, the undertaking could stand a repetition of these phenomenal outputs. It may be true that these were due to an unusual combination of favouring circumstances. But the dominating factor—namely, low temperature—has always to be reckoned with; and this appears (although my observation may be wrong) to tend to increase gas consumption out of proportion to the number of gas-heating appliances actually in use. At all events, we do know that substantial addition to manufacturing plant is not to be thought of during the period of the war. Prudence therefore requires that stock should be taken of the situation, and, if found necessary, a limit placed for awhile to the further fixing of gas-fires.

COKE DISPOSAL.

The question of the disposal of coke is always with us, although the present position is not unsatisfactory, our chief difficulty having been with regard to means of land transport. This, however, is but a passing phase. What is of permanent importance is that more gas consumption means a greater production of coke for which a market has to be found. Considerable interest, therefore, attaches to the suggestion recently made by our friend and colleague, Mr. Carpenter, that its partial use in households should, as a war measure, be enjoined. But are there not other directions in which coke could be advantageously employed? One of these is suggested by the recent substitution by the London County Council, at one of their generating stations, of coke for coal for boiler heating. It looks like a waste of force to convey coal to London at heavy cost, while at the same time allowing coke to be exported, or as an alternative, accumulate and waste in the gas-works yard. There would appear to be scope for some kind of control in this direction.

CO-PARTNERSHIP AND WAR EFFECTS.

I am very pleased to be able to say that our relations with the Company's employees of all grades continue to be as cordial as heretofore; and their loyal and effective co-operation through a most difficult and trying time is very warmly appreciated. They have been serious losers by the war both as co-partners and as proprietors, and have shown by their attitude with regard to this that attachment to co-partnership does not rest solely upon the material advantage which it secures, but mainly upon the bond of sympathy which it creates. As regards the extra cost of living consequent upon the war, we are glad to have been able to assist to some extent by means of the war bonus, and have reason to believe that our action in this respect has been much appreciated. The Directors have also been mindful of the desire expressed at more than one of these meetings that we should keep in touch with the employees and co-partners who are serving with the Forces, and last autumn we renewed to them the season's greetings with a small parcel to each as heretofore. Fifteen of them, I grieve to say, will return no more; and four others are reported missing, of whom one has not been heard of since last July.

THE CALORIFIC VALUE STANDARD.

The fourth paragraph of the report refers to our recent application to the Board of Trade under the Gas Standard of Calorific Power)

Act, 1916, to abolish the illuminating power standard which still covers a part of the Company's limits of supply, and substitute for it the calorific power standard fixed by Parliament in 1912, for three-fourths of the Company's supply. An inquiry has been held by the Board of Trade at which all parties were represented. No decision has yet been arrived at.

THE NEW WAR LOAN.

I should like to add, by way of conclusion to these remarks, that after very careful consideration of the Company's position with regard to the new War Loan, it was decided to subscribe—in addition to conversions—to the extent of £50,000.

The DEPUTY-CHAIRMAN (Sir J. Fortescue Flannery, Bart., M.P.) seconded the motion.

PROFESSOR ARMSTRONG'S VIEWS.

Prof. H. E. ARMSTRONG said he had occasion last week, at the meeting of the South Metropolitan Gas Company, to warn his fellow-shareholders very seriously that great changes might, and indeed would be, forced upon the industry in the near future. He described the method of making gas as barbaric; and the Chairman had just brought before the proprietors some of the consequences and the difficulties they had in the disposal of coke, which could only be used where special appliances were available. A gentleman present—perhaps a barbarian—a gas engineer of the old style, denied his (Prof. Armstrong's) soft impeachment. But he was unrepentant. The Chairman, in his speech, as on previous occasions elsewhere, admitted, though in guarded language, that changes were impending. Reading between the lines, it was clear that he had made slight preparation to meet them, and saw difficulties ahead. Whatever happened, a Company situated as the South Metropolitan was, should be able to hold its own. It would merely have to change its methods; but he wanted to ask very seriously what was their own position likely to be? The position of this Company was a very different one. In the not very distant future, coal would be coked only at certain large centres, and converted into a smokeless fuel suitable for domestic use. No raw coal would be burned in London. But the coking would be carried on in conjunction with large installations for the generation of electricity. The gas produced in the coking process would be diluted with gas made from coke breeze, and would be used as gas now was for heating purposes, but little, if at all, for lighting. Much of the gas would be used as fuel for power plant. Sundry valuable bye-products would be recovered. Would this Company be called upon in the future to do more than deliver gas? That was the question he wanted to put to them. Would it coke any coal? Would it not get gas from the South Metropolitan Company—gas piped to it from some convenient centre where gas would be got out of both coal and coke. These were problems to be solved before long. He said the South Metropolitan Board at the present time not only needed strengthening on the engineering side, but that it was essential that expert electrical and chemical opinion should also figure upon it, because both would be required in order that questions such as those which he had raised might be discussed with feeling. The same was to be said of the Board of this Company. He wished to insist that it wanted strengthening on the technical side. No one questioned the Directors' business ability in dealing with the ordinary affairs of the Company; but most of them could not have had the experience required to deal with these technical problems. On referring to the report, he saw the names of certain Directors who were said to be eligible for re-election. There was one name there—that of Mr. Alexander Dickson, who certainly, in his opinion, was unfortunately not eligible, because recently he had had a paralytic seizure, and so would not be likely to attend to the business of the Company. He was one of those men who had done such great service in the past that his Director's fees ought to be given to him as a pension, and a more active spirit be elected to take his place.

The CHAIRMAN remarked that they had had a very interesting picture as to what, in Prof. Armstrong's opinion, the future of gas supply was likely to be. It might come in the near future; it might be very far distant. But in the meantime their business was to make dividends for the proprietors; and until they could realize better methods and practices, they would certainly continue present methods. But he need not tell Prof. Armstrong they were always open to conviction on any point; and if he or anyone else had a proposal to put before the Board with reference to manufacturing improvements, the Board would be only too pleased to consider it. With regard to the South Suburban Company being absorbed by the South Metropolitan Company, because of the greater facilities of the latter for manufacture, he might remind the proprietors that about three years ago, their own Company acquired land by the river side for the express purpose of securing similar facilities, and which would enable them, as soon as circumstances permitted, to start absolutely new works on most modern lines. It was the full intention of the Board to carry out these works immediately after the war. In the meantime, he invited Prof. Armstrong or any one else who had any new method to propose to lay it before the Board; and he (the Chairman) could give assurance that it would receive very careful and impartial consideration.

The motion was unanimously carried.

DIVIDENDS DECLARED.

The CHAIRMAN moved the declaration of a dividend for the half year at the following rates per annum: 5 p.ct. on the preference stock, 4⅝ p.ct. on the ordinary stock, and 4⅝ p.ct. on the West Kent ordinary stock, less income-tax.

Mr. W. G. WALLER (one of the employee Directors) seconded the motion. On behalf of the employees, he remarked that they would all greatly appreciate what the Chairman had said regarding the men at the Front, and those who had fallen. The co-partners left behind had, he knew, carried out their duties in a very creditable manner.

RE-ELECTIONS.

The CHAIRMAN moved the re-election of Sir J. Fortescue Flannery, Bart., M.P., Sir John Boraston, and Mr. Alexander Dickson, the last named of whom, he said, was unfortunately not able to be present. He was slowly recovering from a very severe illness; but he (the Chairman) had a cheery letter from him a few days ago, in which he desired an apology should be made at this meeting for his absence. His colleagues were looking forward to him rejoining them in the near future.

Mr. HAROLD GUNDRY seconded the motion, which was carried unanimously.

The DEPUTY CHAIRMAN (Sir Fortescue Flannery), in acknowledging the re-election of Mr. Dickson and himself, referred to Prof. Armstrong's remarks, and pointed out that the Government had not only appointed a Coal Controller, but a Board of Fuel Research had been formed, and such questions as the proper use of coal would be very fully considered by them. The re-election of his colleague and himself to the Board in face of the criticism that had been made (which, in his experience as a member of the Board for nearly twenty years had never occurred before) was a matter which spoke of the confidence of the proprietors generally. It had been said that they were lacking in technical knowledge, though they might have commercial knowledge. There was not a Board either in the gas industry or in any other trade which contained a larger percentage of technical skill in relation to the business than did the Board of the South Suburban Gas Company. The Chairman was a gas engineer, who stood second to none; and he managed the technical gas affairs of the City of Birmingham for a great many years. They had Mr. Carpenter, formerly Engineer, and now Chairman, of the South Metropolitan Gas Company—a technical man whose views were looked up to by the whole of the gas profession in England. They had also Mr. Green, who for many years was Engineer and Manager of the Mitcham and Wimbledon Gas Company, and who developed that Company to an extreme degree of practical success. Then if he might venture to speak of himself, they had one who had been making his living as a mechanical engineer from boyhood upwards, and who had the advantage of experience in the gas business over long years through his connection with the Board. Mr. Dickson was the Chairman of the Bromley Gas Company for many years; and their other colleagues were business men of the highest capacity. He might venture to hope that Prof. Armstrong, in going about from one meeting of gas proprietors to another, would equip himself with knowledge as to the history of the Directors, whoever they might be, before he made an attack of this kind—if he might say so, a foolish and unfounded attack—upon the technical qualities of the Board of this or any other Company, and then perhaps he would escape the criticisms which his fellow shareholders indicated in their reception of some of his remarks.

Sir JOHN BORASTON also thanked the proprietors for their confidence.

On the motion of Mr. W. RICHARDS, seconded by Mr. GOULDEN, the retiring Auditor (Mr. E. W. Drew, F.C.A.) was re-appointed.

VOTES OF THANKS

Moved by the CHAIRMAN and seconded by Prof. ARMSTRONG, a cordial vote of thanks was passed to the chief officers—Mr. S. Y. Shoubridge and Mr. Wastell—their staffs, and the employees generally, for their zealous services during a period of great anxiety and difficulty.

Proposed by Mr. DREW and seconded by Mr. R. GARRAWAY RICE, similar acknowledgment was made of the services of the Chairman and Directors.

The CHAIRMAN replied on behalf of himself and his colleagues.

Industrial Heating.

In connection with the Alliance and Dublin Consumers' Gas Company's exhibition of gas-furnaces, which has proved a signal success—having attracted inventors from all parts of Ireland—Mr. H. F. Cotton (the Distribution Engineer to the Company) delivered an address, on "Industrial Heating," to members assembled at the exhibition of the Institute of Electrical Engineers of Ireland and of the Engineering and Scientific Association. At present, he said, the Company were supplying manufacturers with gas at 2s. 2d. per 1000 c.ft., which was the minimum rate on the scale for manufacturers. The Company were controlled, because they were extracting materials for high explosives, and were doing it, in proportion to their size, in greater quantities than any company in the United Kingdom. The Ministry of Munitions had given special sanction to the holding of the Gas-Furnace Exhibition, as being the quickest method for dealing with the manufacture of munitions in the city. It would have been impossible for them to have held it but for the assistance given them by the Government. The intention was primarily to assist those who were thinking of engaging in the manufacture of war munitions, and also those firms who were endeavouring to secure a development of industries after the war. They must consider how gas could best be utilized in Dublin, if the city was to take its proper position among the great centres of manufacture and commerce in the kingdom. The Gas Company desired that all should be acquainted with the uses of gas, and that they should be convinced that it was the cheapest and most readily handled fuel for all industrial purposes. Mr. P. Cowan (Chief Engineering Inspector to the Local Government Board for Ireland) presided during the address.

Tribunal Case at Southport.—At the Southport Tribunal last Thursday, Mr. John Bond (the Gas Engineer) appealed for an assistant chemist named Leslie H. Smith, aged 18, and classed as A1. He said that this youth was the only one left to carry out laboratory experiments at the works, which were concerned with products highly essential in the war. He (Mr. Bond) had important work in hand; and it was impossible for him to continue the work if he had not someone to test the samples. He himself had invented a plant for producing more of the things required by the Government; and he hoped to improve it by the assistance of this man. He could not be replaced at the present time, as it was very difficult to get chemists. Every man he could spare he had sent; and he did not think they had at the works more than half-a-dozen men of military age. He got a certificate for this man from the Ministry of Munitions, but did not want to go over the head of the Tribunal. Exemption to June 30 was granted.

CROYDON GAS COMPANY.

The Half-Yearly General Meeting of the Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. William W. Topley) read the notice calling the meeting, and the Directors' report and statement of accounts were taken as read.

PROGRESSIVE ACCENTUATION OF DIFFICULTIES.

The CHAIRMAN, in moving the adoption of the report and accounts, said the proprietors had before them the results of the fifth half year in which the business had been carried on under war conditions; and, speaking generally, they might be said to have been marked by a progressive accentuation of the difficulties they had had to meet. That, under these circumstances, they had been able to so steadily maintain their position, and to so regularly continue their wonted service to the public, was evidence of the willingness and adaptability of the workmen and staff, both permanent and temporary, particularly in the manufacturing department, where their difficulties, under rapidly varying conditions of demand for gas, had been most acutely felt.

THE DIVERSE USES OF GAS.

The output of gas had been maintained, and slightly increased, as compared with a year ago. This, having regard to the severity of the restrictions on public and shop lighting, was, he thought, satisfactory. This steadiness of the output from year to year—its freedom from any violent fluctuations—was not only helpful to good working, but indicated that the business was, so to speak, well distributed, and established on a broad basis of public demand. Where, as was the case with the Company, gas was in good and growing demand for lighting, for cooking, for warming rooms, for hot water supply, as a source of motive power, as well as for numerous and ever-growing specialized industrial applications, they might feel assured that the future of the Company was well secured, and its outlook a good one, whether under trying conditions like those they were now passing through, or in the happier times which it was hoped would soon come.

EXTENDING THE BASIS OF THE BUSINESS.

The number of consumers had grown in the half year by 431, making a total of 47,138. Some 1810 had been added to the stoves on hire, which now numbered 50,483, or 107 to every 100 gas accounts. This number, it was interesting to compare with ten years ago, when they had on hire 17,079 stoves, or 58 to every 100 accounts. In addition to this, they had in the last few years sold, outright or on hire-purchase terms, large numbers of stoves, geysers, circulating boilers, and other appliances, besides having let a considerable number out on hire.

CAPITAL EXPENDITURE AND DELAYED CONTRACTS.

The expenditure during the half year on new plant had, as would be seen, not been considerable. The Directors wished it had been greater; for the delays in the execution of contracts on hand had been a source of much inconvenience and actual loss to the Company. The new gasholder had never been so urgently needed as during the last few weeks of severe weather, about which he should have something to say later. They had expended over £20,000 on the tank, and some £9000 on the holder. All this outlay was so far without any return to the Company—the holder still being unfinished. The resources of the contractors were, and had been for some time, entirely occupied in meeting the war requirements of the Government; and the Company must await, with what patience they could, the time when their needs in their turn could receive attention. They had also had on order for a year, plant for treating part of the tar, so as to separate from it the constituents needed for war purposes, leaving the remainder in a condition suitable for use on the roads. This was to have been completed last March, in time for the summer season; and the failure to complete it had resulted in their having to send all the tar away for treatment, and get it back at an added cost nearly equal to its original value. However, they had reason to think that this would not be the case in the coming season. They had also in course of erection a debenzolizing plant; and on its completion they would be able to largely increase the contribution they were making to the nation's need of explosives. This contribution was a source of little or no profit to the Company; but they naturally wished to meet the desires of the Government in every possible way.

LOW TEMPERATURES AND HIGH GAS DEMANDS.

The last few weeks had furnished a striking illustration of the extent to which the public availed itself of the convenience of having always "on tap" a cleanly and convenient gaseous fuel. The output had shown increases—up to 37 p.ct. in one day—over the corresponding days of the previous year. He might mention here that, due to the severe weather, the average increase since the beginning of the year had been 21½ p.ct. In this connection, the lack of storage capacity had proved a very serious handicap. The carburetted water-gas plant had been an invaluable—though at the present price of oil a costly—ally; and he was glad to say their Engineer had been able to maintain undiminished the pressure of their gas. On Feb. 8, they sent out over 7,400,000 c.ft. of gas, thus exceeding the previous mid-winter record. Practically all the retorts had to be brought into use; and one of the earliest developments of the works, when circumstances permitted, must be the provision of additional carbonizing plant.

RESIDUALS AND RAW MATERIALS.

Residuals had, with the exception of tar, met with a ready sale, and at good prices, though, as the proprietors would see from the accounts, the increased receipts under this head were less than proportionate to the increased cost of coal and oil. The former had, on the half year's working, increased by 11 p.ct., the latter by 28 p.ct.

THE VALUE OF A LARGE COAL STOCK.

For some time past, the question of coal supplies had presented great difficulties; and the quantities they had been able to get in had been considerably less than those used. Thanks to the fact that they had largely increased their stock during the autumn, the resulting depletion of the stores had been a matter for less anxiety than would otherwise have been the case. The scarcity of vessels, and the longer time occupied in each voyage, had rendered deliveries of seaborne coal irregular, to say nothing of the cost to the Company of the high rates of freight which had been current. Railborne coal also had been delayed by shortage of trucks.

ADDITIONAL CAPITAL NECESSARY.

The necessity they were under for holding, at times, much larger stocks than had been customary in the past, and the high prices which prevailed, rendered necessary the employment of larger amounts of floating capital; while, as he had indicated, a considerable outlay on manufacturing plant would have to be undertaken as soon as possible. The trunk mains must also be increased in the near future. The Directors thought it well, therefore, to take the first available opportunity of raising further capital; and the proprietors would be asked to pass two resolutions enabling them to do this. At the present time, as they knew, the sanction of the Treasury had first to be obtained; and they had made application for this. It was, of course, not intended to raise the whole of the capital at once. It would be raised from time to time as the necessity arose, and as the market conditions admitted.

PROSPECTS AS TO PRICES.

He need not take up time by making monetary comparisons, item by item, between last half year and a year ago, as the proprietors had the figures before them in detail. With regard to the early future, when the question of the prices of supplies under contract for the coming twelve months would have to be dealt with, he feared there was not much likelihood that they would purchase coal at a less price than now; but the Directors hoped to avoid an increase. The price of oil was more uncertain, and depended mainly on freightage of the special tank steamers in which it was conveyed to this country. The Directors regretted that they could not see at present any likelihood of it being possible to make an early reduction in the price of gas. Indeed, several undertakings were intimating that a further advance of price would be necessary.

TEMPORARY STOPPAGE OF THE CO-PARTNERSHIP BONUS.

It was to be regretted also that one result of the last advance in the price of gas was that the bonus received by the co-partners, under the sliding-scale on which the scheme was based, ceased for the present to be payable. He was glad to say, however, that, speaking generally, their employees had recognized that this was inevitable, and were content to wait until their efforts, with those of the Board, would, in happier times, enable the declaration of a bonus to be again made.

IN THE SERVICE OF THE COUNTRY.

It would be seen that over 300 of the Company's employees had joined the Forces; and quite recently a few more had gone. This was a large proportion, and left them but few men who were of age and physically fit for military service. They had had to mourn the loss of some; and among them some very promising young lives. The deepest sympathy of the proprietors would, he knew, go, with that of the Directors, to their relatives and friends.

WAR FINANCE—COMPANY'S AND EMPLOYEES' PARTICIPATION.

The Company's investments in Government stock had been converted into 5 p.ct. War Loan. The Company's position with regard to available capital was not such that the Directors felt they could, with any advantage to the country, borrow for the purpose of further investment; but they had offered special facilities to the employees for investment in war savings certificates, and—by means of endowment assurance policies—in War Loan. The proprietors would, he felt sure, be glad to know that in all over 3000 of the former and over £2000 of the latter had been taken up; the response, both from permanent and temporary employees, having been in most departments very gratifying.

THE HALF-YEAR'S FINANCIAL RESULT.

The accounts for the half year showed a net profit amounting, with the sum brought in from the previous half year, to £36,894; and, having earned the dividends, the Directors proposed to pay at the same rate as last half year, leaving £12,792 to be carried forward.

The DEPUTY CHAIRMAN (Mr. Thomas Rigby) seconded the motion, which was unanimously adopted.

THE DIVIDENDS.

Mr. WILLIAM CASH, F.C.A., proposed the declaration of dividends at the following rates per annum, less income-tax: On the "A" stock, 14½ p.ct.; on the "B" and "C" stocks, 11½ p.ct.; on the "D" stock, 5 p.ct.; and on the "E" stock, 10 p.ct. He remarked that the Chairman, in his interesting address, had told the proprietors that the dividends had been earned, and the amount carried forward, after payment of the sums involved by the dividends, would be slightly more than the sum brought into the account. Therefore, there could be no question that the dividends were properly payable; and they would be taken with some satisfaction. There was just one matter which occurred to him, and that was the position of co-partnership. The Directors all regretted that the bonus had for a time ceased. But it was proper to add that the Directors had at various intervals since the war broke out considered the question of the wages payable to the employees, and had granted to them and to members of the staff a war bonus to meet the increased cost of living, under which all were suffering at the present time. This went some way towards compensating for the fact that there was nothing available under the co-partnership scheme. There was another thing that should be borne in mind in connection with co-partnership; and it was that the scheme was largely intended as a means of promoting saving and thrift among the employees by enabling them to invest in the stocks of the Company.

Mr. HENRY WOODALL seconded the proposition, which was unanimously agreed to.

RE-ELECTION OF DIRECTORS AND AUDITOR.

The CHAIRMAN, in moving that Mr. Thomas Rigby be re-elected to his seat at the Board, said that his colleague and himself entered upon their directorships within a few months of each other. No Director

could be more anxious than Mr. Rigby to do all he possibly could in the interests of the Company.

Mr. PERCY H. HALL seconded the motion, which was cordially passed.

Mr. CASH proposed the re-election of Mr. Henry Woodall. He observed that the proprietors knew how many years, and with what enormous advantage, the late Sir Corbet Woodall gave his services to the Company. It was only recently that they had elected Mr. Woodall to follow his father. In the short time he had been a Director, they had realized all their expectations of him, and had derived great advantage from his presence on the Board. Mr. Woodall had, as they knew he would do, put his very wide experience in connection with a great number of other companies entirely at their service.

Mr. W. J. RUSSELL seconded the motion, which was heartily passed.

Both Mr. RIGBY and Mr. WOODALL responded.

Moved by Mr. J. T. MAITLAND, and seconded by Alderman MARTIN TAYLOR, the retiring Auditor (Mr. John Jones) was unanimously re-appointed.

AUTHORIZATION TO CREATE AND ISSUE NEW CAPITAL.

The CHAIRMAN next moved a resolution authorizing the Directors, under section 4 of the Company's Act of 1904, from time to time, to create and issue additional capital amounting in the whole to £75,000, inclusive of premiums; also under section 14 of the same Act to borrow on mortgage or by the issue of debenture stock, inclusive of premiums, one-third part of the additional capital fully paid-up. He wanted to impress upon the proprietors that it was absolutely necessary the Directors should take this vote, because, as he had shown in his speech, they had been working very close this season; and the position—an insufficiency of storage, and nearly every retort in use—had been one of the gravest anxiety to their Engineer and Works Manager, Mr. Caddick. This was not a nice position for any Company to be placed in. It was not intended to raise the capital all at once, though the Directors were now seeking authority to issue it, instead of asking the proprietors every few meetings for their sanction to raise smaller amounts. As in the past, the money would be spent judiciously.

The DEPUTY CHAIRMAN seconded the motion.

The CHAIRMAN, replying to Mr. Charles Webb, said the Directors had already made application to the Treasury for permission to issue capital; and they hoped there would be no difficulty in securing it. He could not say whether it would be issued by auction or tender. The method of issue would depend largely upon the circumstances at the time.

The resolution was unanimously passed.

DIFFICULTIES OF THE WINTER.

Moved by Mr. WEBB, and seconded by Mr. MAITLAND, a hearty vote of thanks was passed to the Chairman and Directors—the mover remarking upon the strenuous times which all responsible for the administration of gas concerns had had, and still had, to face.

The CHAIRMAN expressed, on behalf of his colleagues and himself, his appreciation of the confidence of the proprietors. They would in the future do their best to produce as good a balance-sheet as they had that day. He did not promise that they would succeed in doing so, as no one knew what the future would bring forth. At the same time, every proprietor should be satisfied with the balance-sheet that had been put before them; it had certainly surpassed the expectations of the Directors. Thanks to the Engineer and the Distributing Engineer and Sales Manager, they had done exceedingly well. Proceeding, he moved a vote of thanks to the officers, staff, and workmen, for their efficient services during the half year. No Company could be served by a better or more faithful staff. The experiences of the winter had caused Mr. Caddick great anxiety night and day. Just recently he had not been worried with Zeppelins. As perhaps some of the proprietors knew, when raids were on, they had to close-down the manufacture. If this had happened during the three weeks of frost, he did not know how their Engineer would have been situated. He had had a trying time, but he had battled with it, and had maintained the pressure of gas, and everyone had had a proper supply. The men and employees generally worked heartily during this trying time to assist the Engineer at the works and Mr. Sandeman in the distribution department. Mr. Sandeman had also had a great deal of anxiety, because men of a certain age, from whom they got most work, had been replaced by men who were not of such good physique, though willing to do their very best. Mr. Topley, too, had suffered through his experienced men being taken from him. But the women employees had cheerfully taken up the work, and did their best.

The DEPUTY CHAIRMAN seconded the motion, which was heartily agreed to.

A TIGHT SQUEEZE.

Mr. CADDICK, in responding, said the Chairman had been particularly kind in moving the vote of thanks; and he should like to thank him for, and the proprietors for their confirmation of, the terms in which the resolution had been put. The Chairman had said that this winter had been an anxious period. He did not know that a stronger word might not have been used; but he (Mr. Caddick) thought from the figures given the proprietors would understand what a large volume of gas they had been called upon to supply. It might, perhaps, interest them to hear that, for thirty-three consecutive days, a daily increased quantity, compared with the corresponding period last year, of about 1½ million cubic feet was sent out. The increase from Jan. 1 to date was 21 p.ct.—approximately 60 million cubic feet of gas. Though they had had to do this, the storage capacity was only 4½ million cubic feet, which represented, roughly, 60 per cent. of the maximum daily output, or 14 hours' storage. In these circumstances it must be a source of satisfaction to consumers that the Company had been able to maintain the pressures. He should like to thank his staff—particularly his chief assistant and principal foremen—for their valuable help all through this period, and the workmen, too, had generally pulled together to do their best in the anxious times. With regard to coal, they were fortunate last summer in getting together a large stock; but since the autumn they had had to deplete the quantity by 17,000 tons. To have to provide for so large an amount from store, and take it to the retort-houses, had occasioned them at times, with the considerable shortage of labour, the greatest anxiety. They had had to call in the help of women. About thirty were employed in the coke yard, in bagging sulphate and for various other work that they were able to do. All credit to them. They had tried to do their very best to help while the men were fighting for the country. He also expressed his thanks to the Chairman for the personal references to himself.

Mr. TOPLEY, replying on behalf of the employees engaged in the departments for which he was responsible, said that, for his own part, he counted himself to have been very fortunate, during the far from normal times through which they had been passing, to have worked under conditions in which, on the one hand, he had so kindly and sympathetic allowance made for their difficulties by the Directors, and, on the other hand, he had such loyal support and assistance from the staff, both permanent and temporary. Things had not been easy for any of them; but circumstances like these made them as little difficult as, under such conditions, they could be. The Chairman had made reference to the fact that in the clerical department, and in the collection of money from the weekly prepayment meters, they had to avail themselves largely of the assistance of women. He should like to say he had every reason to be satisfied with the manner in which those whom they had called in to assist them had buckled to the tasks laid upon them.

Mr. W. J. SANDEMAN (Distributing Engineer and Sales Manager), in expressing appreciation on behalf of the distribution department, said that so far as his staff and men were concerned, he felt the vote was thoroughly deserved. No chief officer could have a more loyal staff than he had. The proprietors might be interested to know that, during the half year, in addition to their ordinary work in looking after the mains and services and plant generally in the district, they had dealt with no less than 60,000 orders from consumers; and this had been done with a staff depleted to the extent of nearly 200. From this the proprietors would realize they had not been idle.

BOURNEMOUTH GAS AND WATER COMPANY.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. WILLIAM CASH, F.C.A., in the chair.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice calling the meeting, and the minutes of the previous meeting; and the Directors' report and the statement of accounts were taken as read.

THE ABSENCE OF MR. G. CRISPE WHITELEY.

The CHAIRMAN said that, before proceeding to make the few observations which he had to address to the proprietors, he had first to explain the absence, which they all very much regretted, of the Chairman of the Company—Mr. G. Crispe Whiteley. Everyone present would be sorry that he was not able to be with them. He thought it was the first occasion since Mr. Whiteley had occupied the chair that he had not been present at one of the half-yearly meetings of the Company. In addition, he was a most regular attendant at the Board meetings.

UNDER WAR CONDITIONS.

The meeting that day was again being held under war conditions; and these conditions, which were not peculiar to their own Company, but had affected all gas undertakings alike, had been serious, and had in various ways given rise to very great difficulty in the working. Coal had been difficult to obtain; and the same had been the case with all other materials—including such things as sulphuric acid, which was used in sulphate making. Then, in addition to the difficulties in obtaining supplies of materials, they, along with most other gas undertakings, had been faced with great difficulties in connection with labour. During the past half year more of their employees had joined the Colours; and besides this the attractions of Government employment in the immediate neighbourhood had taken away a number of their former servants. The Board had tried to meet war conditions, so far as the employees were concerned, by paying them a reasonable bonus, which it seemed to them only just and proper to do—particularly in view of the increased cost of living. Then they had endeavoured to meet the position arising through shortage of labour by the employment of women—again in common with other gas undertakings. They had female employees—in the offices, on the district, in the stove shops, and also assisting in the purifying department, in handling coke, and in the work of shell-making with which the Company had been entrusted by the Government. Altogether there were some hundred women engaged in this way; and the number was increasing. So far as the war was concerned, he could only repeat what the Chairman had said six months ago—that the Company were doing what they could to assist the Government, first by the extraction of benzol and toluol from the gas which they were manufacturing; secondly, in connection with the making of shells, for which work they had lately been entrusted with a new contract by the Government; and, thirdly, by assisting the Senior Service (the Admiralty) at Poole in a certain direction in regard to which they must pardon him not going into details.

OBTAINING COAL UNDER DIFFICULTIES.

The proprietors would probably ask how, under all these circumstances, the Company had been able to carry on their business. It had been a matter of considerable difficulty, because of the position in which the Company found themselves. When, in 1902, they took over the undertaking of the Poole Company, they went to the town and erected the present works there, largely to enable them to obtain the facilities for water carriage which the harbour there offered. This was a step which the Directors had never regretted; but, in consequence of the position existing at sea to-day, it had not, of course, been easy to get coal there by water from the North. The position at Poole had been further complicated by the fact that the railway accommodation was extremely limited, and merely supplemented the supplies which in the past had been mainly derived by water. The same circumstances had led to considerable difficulty in the disposal of their tar. So acute, in fact, had the tar position become, that they had had, for a period at least, to take it by road from Poole, and store it at

Bourne Valley, thus involving double handling and increased expense. He was glad to say that the coal steamer, for which they had had a contract extending over some years, still continued to run; but the time taken by each trip from the North had been considerably extended. In view of all the facts, it would be easily realized that the transport of coal by this means had been a matter of much difficulty.

THE ACCOUNTS.

In connection with the accounts, there were one or two matters to which he would like to draw attention. Taking first the capital account, it would be seen that the sums written-off for depreciation and on account of works displaced were greater than the amount expended during the half year on capital account by £2225. This was a very satisfactory feature. If the proprietors would turn back to the accounts for the half year to Dec. 31, 1914—that was, taking a review of two years—it would be noticed that the total capital expended by the Company had actually decreased by the sum of £1039. Then, again, he would invite attention to the fact that they had written-off the full amount for depreciation in respect of short-lived plant. This had not been stinted in any way. The sum charged this half year was £5180, as compared with £5346 in 1915. Then as to the revenue account, it was stated in the report that receipts under every head showed a substantial increase, The quantity of gas sold had gone up nearly 35½ million cubic feet; and he thought it was matter for congratulation that this increase had been derived, not only from the prepayment consumers (of whom there were now a great number), but also from the ordinary consumers. This indicated that the sale of gas was still very considerable in the larger houses and shops of Bournemouth. The increases were: Ordinary consumers, 27,850,000 c.ft.; prepayment, 7,750,000 c.ft. There was, on the other hand, a small decrease of some 250,000 c.ft. under public lighting. The increase over all for the half year was 6·83 p.ct. Another interesting matter in connection with this was to see how the average consumption had been steadily growing. This was particularly marked among the prepayment consumers. The average consumption for them in Bournemouth in 1912 was 17,783 c.ft. per house. There was a slight decrease in 1913; but for 1916 the figure had risen to 20,555 c.ft. The figures were similar in the Poole district, where, in comparison with 1912, the consumption per house had risen from 12,453 c.ft. to 16,703 c.ft. Rental of meters and stoves had increased; and receipts for residuals were also greater. This was what one would naturally expect to see, when the demand for fuel by all classes was so great. In the water department, there was an increase of 1½ per cent. They had been helped to some extent by the fact that the past summer was a distinctly wet one, so that the total quantity of water pumped into the district was rather less than a year ago. Thus they had reaped some small advantage from the price realized per 1000 gallons pumped being slightly more than in 1915. The expenditure on coal and oil together showed an increase of £11,853. This, he should explain, was after bringing back in relief of this half year about £1850, which was shown in the balance-sheet of the June accounts in a suspense account. This had been provided in earlier years—principally in the year 1915, when a sum of £2500 was put on one side to meet this very increase. The coal suspense account in the June balance-sheet figured at £3830. Now £1850 had been used in the manner he had indicated, and the rest had been employed for payments of insurance in connection with the bringing of coal from the North. The real rise in the cost of coal, therefore, was more than was actually shown in the revenue account for the half year. There had been some slight saving in connection with the production of carburetted water gas; but this was a gain that could only be regarded as temporary, inasmuch as they were anticipating a considerable increase in the price of oil. Residuals produced £4193 more than in the corresponding period of 1915; and gas sales showed an increase of £4775. The whole of the latter gain was due to the increased quantity of gas sold; the price had been the same in the past six months as it was a year ago. Items of expenditure other than those he had referred to showed increases. Carbonizing wages were some £400 more, sundries on works £600 more, and maintenance of works £1800 more. The last-named amount was mainly accounted for by the fact that they had had to spend during the past half year a very substantial sum on renewals to the vertical retorts. As a matter of fact, the sum charged would have been still greater, if they had not provided for it in a measure in the earlier half of 1916. On the other hand, a saving had been effected in maintenance of mains and services. Probably somewhat less work had been done, due to the difficulty of obtaining labour to carry out repairs in the ordinary course. It was not necessary to trouble them with further details; but he might say that the balance of profit was £28,847, as compared with £29,330 in 1915; so that, as the final result of the whole working, the profit was less by only £500 than was the case twelve months ago. If they turned for a moment to the profit and loss account, they would find a very substantial sum charged there for income-tax. One reason for this was that the increase in the rate of the tax meant a corresponding increase in the charge, as most of the amount which appeared here was the difference between the sum paid on the assessment of the whole of the profits and the sum recovered from the proprietors on the amount distributed as dividend. It was proposed to pay the usual dividends, and to carry forward £24,435, which compared with almost the same sum carried forward after the distribution of the dividend at the end of 1914. In the balance-sheet it would be noticed that they still held the war relief fund, which was created to deal with cases of distress arising from the war. Provision for deferred renewals—primarily in connection with mains—had been made by setting aside £1500. He had enumerated the various difficulties in relation to the working; but he had the satisfaction of being able to add that the supplies of gas and water had been well maintained throughout the half year. So far as any of the consumers might have been in a minor degree inconvenienced by alterations in the Company's methods, the Directors expressed to them their thanks for the forbearance shown.

THE FUTURE AND THE PRICE OF COAL.

Though he did not profess to be a prophet, he must turn for a moment to the future—for one reason. On looking back, it would be found that in 1914 the net cost of coal—that was, deducting from the gross cost the amount realized for residuals—was 7s. per ton. For the past half year, however, the net cost worked out at 14s. 6d. per ton. This was caused by two circumstances. The first was the rise in the price of coal. This had been followed, of course, by an advance in the value of residuals. But as they only secured from a ton of coal some 11½ cwt. of coke, even if the price of coke followed the price of coal, the percentage recovered from the sale of residuals was very much less. In 1914, the amount realized worked out at 63 p ct. of the cost of the coal; whereas in the past half year the figure fell to 50 p.ct. In common with other gas undertakings, they saw no chance of any reduction in the price of coal; and the cost of oil must also be heavy. This was very largely due to high freightage, and the fact that both these commodities had to be brought by sea, either across the Atlantic or from the North. Still, it must not be thought that the Directors were in any way losing confidence in the undertaking. He believed the shareholders had a magnificent property in this undertaking, and that when the unfortunate war came to an end the former prosperity would be entirely restored.

A LARGE INCREASE THIS YEAR.

During the last few weeks at Bournemouth they had been having a most unusual time; and the Manager had been having a most extraordinary experience. Bournemouth appeared to have been one of the coldest places in England, contrary to its reputation; and the effect of the low temperature had been extremely marked. Down to the end of the previous week—that was to say, about seven weeks' working—the total sales of gas showed an increase of 25 p.ct. This percentage had been in some weeks more than 40. In addition to placing a great strain upon the Company's resources and staff, it had had the unfortunate effect of depleting the stock of coal, and of driving the Company on to the market, where they had no wish to buy except for ordinary requirements. In normal times, of course, they would welcome this substantial increase with great satisfaction; but to-day the purchase of the extra quantity of coal needed was not a matter for congratulation.

THE PRICE OF GAS.

It would have been noticed from the report that the Directors proposed, from Lady-day next, to increase the price of gas 2d. per 1000 c.ft.; and it was the factors to which he had been calling attention that had compelled them to this decision. The increase in price was inevitable; but it had been made by the Board with regret. The Company had always regarded with pride the price at which they had been able to sell gas in their district. They had realized all along that it was their duty and pleasure to study the interests of the consumers as well as those of the shareholders; and they would not have taken the present step if they had not felt that it was absolutely necessary. Down to Lady-day, 1915, the price was the low one of 2s. 6d. per 1000 c.ft. It was only then that it was raised 4d., making the figure 2s. 10d. in Bournemouth. They would, therefore, have gone for two years without any further increase in price; and he ventured to think that the charge which would rule from Lady-day next, of 3s., would still be a low one, and that the addition to be made was not at all extravagant—more especially when compared with what had been done by other companies. He had just pointed out that coal had risen about 7s. per ton; and this alone was equal to an increase of some 7d. per 1000 c.ft. in the cost of gas, leaving out altogether other matters—such as labour and materials. Those who lived in the Metropolis would know it had been found, after advancing the price 6d., that a further increase would be necessary in the near future. As far as the shareholders in this Company were concerned, the rise in price now proposed would entail a reduction in the dividend on the original shares of ½ p.ct.; and it would also unfortunately affect the co-partners, whose bonus depended upon the price of gas. It was hoped and believed that the consumers would realize the necessity for this alteration. The total sum that would result from the 2d. increase, if the consumption remained as at present, was not very large—being only about £9000 per annum. A possible effect might be to check consumption; and if this should happen it would not, under the circumstances, be entirely a matter for regret.

THE CALORIFIC STANDARD.

It was announced in the report that the Directors had made application to the Board of Trade, under the Gas (Standard of Calorific Power) Act, 1916, for the substitution of a calorific standard of test for the present basis of illuminating power. This application was almost invited; Parliament having passed a Special Act to facilitate the alteration. The calorific test had been granted to many companies and local authorities after very careful consideration by Parliamentary Committees prior to the war; and their Company proposed to adopt this modern method, if the Order was granted, as they had every reason to believe it would be. It might be said by some of the consumers, "This test is granted to you because you are carrying out certain things for the Government, particularly the recovery of benzol and toluol; and you are reaping substantial advantage from this. Why, therefore, is it necessary to increase the price of gas?" The answer was that such advantage as they had reaped—and it was not a great matter—had helped to keep the price down so far. Had it not been for this advantage, the Board might have been compelled to increase the price before now. He might remind them it had been necessary to provide special plant to carry out the desired method of treatment.

THE WAR LOAN.

Since the preparation of the accounts now presented, the Directors had invested a further proportion of the reserve fund in the new War Loan. They had been glad to be able to subscribe £10,000, in addition to converting into the new loan £24,257 which they had in the old 4½ p.ct. stock.

THE STAFF AND EMPLOYEES.

Their sincere thanks were due to the Acting General Manager (Mr. P. G. G. Moon) for all that he had done, with his staff. He had risen to the occasion most nobly, and displayed great resource and ingenuity in dealing with the difficulties that had beset him and his staff in the half year. They must also extend their thanks to the men and women who had assisted throughout the works and offices. The Company

had always been well served by their officers; and he ventured to think that the undertaking seemed to be a good training ground for those who had been associated with it.

PERSONAL

It would be noticed from the front page of the report that the Engineer and General Manager, who was in India, and had there been actually engaged in fighting, was now Lieut.-Colonel Harold W. Woodall; and they heartily congratulated him upon this promotion. Mr. Moon's predecessor with the Company—Sir Arthur M'Dougall Duckham—who was, with Mr. Harold Woodall, the originator of the Woodall-Duckham vertical retort system, which had its birth in their own Bournemouth works, had had conferred upon him the distinguished honour of K.C.B.; and they must also congratulate him heartily. The Company owed thanks to their Contractors, who had throughout done extremely well for them, both in the way of running the steamer and in maintaining the supply of coal. Among these Contractors were Messrs. Stephenson Clarke & Co.; and it was a coincidence that in the same list of honours should appear the name of Sir Stephenson Kent, who had also been made a K.C.B. He was glad to see present at the meeting Mr. Robert H. Glen, one of their Auditors. He also had been serving King and country, and had just returned on short leave from the North Sea, where he had been carrying out dangerous and important duties. He concluded by moving that the report and accounts be received, adopted, and entered on the minutes.

Mr. CHARLES L. MORGAN seconded the resolution, which was put to the meeting, and carried unanimously, without discussion.

THE DIVIDENDS.

On the proposition of the CHAIRMAN, seconded by Sir CHARLES J. JESSEL, Bart., dividends were declared at the rates per annum of 6 p.ct. on the preference shares, 7 p.ct. on the "B" ordinary shares, and 15 p.ct. on the original shares – all less income-tax.

RE-ELECTION OF DIRECTORS AND AN AUDITOR.

The CHAIRMAN moved the re-election as a Director of Mr. G. Crispe Whiteley. Mr. Whiteley he said was so well known to them that it was not necessary for him to add anything, except to express, on behalf of the proprietors, their regret at his absence, and their sincere hope that he might soon be completely restored to health.

The Right Hon. Sir DANIEL F. GODDARD, M.P., seconded the proposal, which was unanimously passed.

Thereafter Mr. Cash was re-elected a Director, on the motion of Sir CHARLES JESSEL, seconded by Mr. MORGAN; and Mr. R. H. Glen was re-appointed an Auditor, on the proposition of Mr. F. G. PILLEY, seconded by Mr. L. B. WELLS.

A VOTE OF THANKS.

A hearty vote of thanks to the Chairman, Directors, and members of the staff in London and Bournemouth was duly carried, and briefly acknowledged by the CHAIRMAN.

Mr. MOON, in returning thanks on behalf of the Bournemouth staff, admitted that it had been a time of special stress and difficulty. The chief troubles were in connection with the supply of material and labour—principally material. However, he could safely say that, so far as it was necessary and possible, any extra effort over the efforts they had already made would be willingly forthcoming from every member of the staff at Bournemouth. He was glad to hear the Chairman refer to Lieut.-Colonel Woodall. He (Mr. Moon) often heard from him, and his sympathies and his thoughts were still with the Company. He was looking forward very longingly to the time when he would once again resume his usual place and duties with the Company. They at Bournemouth were also proud of the distinction that had come to Sir Arthur Duckham. There was no doubt whatever that the splendid work he had been able to do for his country had thoroughly well earned for him the honour he had received.

Mr. PLUMB also acknowledged the vote on behalf of his staff and himself; and this brought the meeting to a close.

CHESTER GAS COMPANY.

Mr. Belton's Resignation.

The report of the Directors, which was adopted at the half-yearly meeting of the Company on Monday of last week, stated that there had been a decrease in consumption during the past six months of about 9 p.ct., largely attributable to economies effected by the Daylight Saving Act and the stringent lighting orders. In order to comply with the requirements of the Ministry of Munitions, the Directors decided to erect plant for the recovery of toluol and benzol. It was hoped the process would soon be in operation; and the Directors accordingly applied to the Board of Trade for a calorific power standard. The net balance to the credit of profit and loss account was £4097; and the Directors recommended the payment of a dividend on the ordinary stock in respect of the half year ended Dec. 31 at the rate of 2½ p.ct., making, with the interim dividend, the maximum rate of 5 p.ct. for the year.

Addressing the shareholders, the Chairman (Alderman J. M. Frost, who is Mayor of Chester) said that, while they had spent a substantial sum on repairs and maintenance of works, there had been a reduction of over £300 in repairs of mains, services, and meters. It was impracticable to attempt to defer repairs or renewals connected with the manufacturing plant, even under the present war conditions. At all costs, this must be kept in first-class order. But in regard to distribution costs, they had had to curtail the work to an absolute minimum. The receipts for gas were not reduced to the full extent of the diminished quantity supplied, because they had received an increased price from the prepayment meters, which had not been altered the previous year, when an advance was made to the ordinary consumers. The return from coke had been much better; but tar had realized a lower price, affected no doubt to a certain degree by the distillers' want of shipping facilities. Sulphate had yielded only a poor return, owing to higher costs of manufacture and diminished make. The net result of the half-year's working was satisfactory, inasmuch as they were able to carry to net revenue a sufficient balance to meet charges for interest and pay the statutory dividends. The Board had converted the reserve fund investment from the old 4½ p.ct. loan into the new 5 p.ct. loan. In view of the increased costs of manufacture, they did not feel justified in taking up any of the fresh loan, in case of jeopardizing the price of gas, which the Board considered would be detrimental to the public generally; and without prospective increased profits, they had no funds available for investment. "I feel," concluded the Chairman, "that I cannot close without reference to the resignation of our late Engineer, Mr. J. C. Belton, who had held that office for the past eighteen years, during which period he had seen to many alterations and improvements in manufacturing plant and distribution; and we wish him all success in his future. In his place, we have secured the services of Mr. J. H. Noble, and have confidence that the considerable experience he has gained in the Coventry Gas-Works will not only be of assistance to himself, but advantageous to our undertaking. I should like to take this opportunity of stating the Directors' appreciation and thanks, not only to the staff, but the workmen for their splendid support during the past difficult year. We feel they have done everything in their power to maintain for the shareholders and consumers efficient results, notwithstanding the inconveniences that one and all have to contend with."

WAKEFIELD GASLIGHT COMPANY.

The annual meeting of stockholders, on Monday of last week, was presided over by Alderman G. A. Moorhouse, J.P., who at the outset made appropriate reference to the part the employees of the Company are playing in the great war. About forty have joined the forces. Four of them have made the greatest of all sacrifices, and given their lives for their country; three are prisoners of war in Germany; and several others have been more or less seriously wounded.

In moving the adoption of the report, the Chairman referred to the continued high prices of coal and every other commodity used in the manufacture of gas. The cost of coal, he said, was the highest on record; and the difficulties were increased by the altered conditions of delivery, which were now equal in summer and winter. The consumption of gas showed a decrease of 26,992,700 c.ft., or 9·12 p.ct., owing chiefly to the lighting restrictions and to the operation of the Summer Time Act. Residual products exhibited a satisfactory increase, mainly in consequence of the increased return from coke. Tar, a product which was of great value, remained at a very low figure, chiefly because of the difficulty existing with regard to pitch. The balance of revenue was £1610 short of the amount required to pay the year's dividend; and the Chairman uttered the warning that, if prices went up any higher, it might be necessary to still further advance the charge for gas. Up to the present, he pointed out, the increase made was among the lowest in the country, and much less than in the case of many neighbouring undertakings.

The report was adopted, and the payment of final dividends of 3 p.ct. on the ordinary stock, making 5½ p.ct. for the year (which is the same as last year, but 1 p.ct. less than for many previous years), and of 2½ p ct. on the maximum stock, making 5 p.ct. for the year, was agreed to. The meeting closed with the customary votes of thanks to the Chairman and Directors, and to the Engineer (Mr. H. Townsend), the Secretary (Mr. R. B. Wilson), and their respective staffs, sympathetic reference being made to the heavy bereavements sustained by Mr. Townsend in the loss, first of his two sons in the war, and more recently by the death of his wife.

Price of Gas at Marlow.—The gratifying announcement is contained in the report for 1916 of the Directors of the Great Marlow Gas Company, Ltd., that to private consumers the price of gas is reduced 2d. per 1000 c.ft. as from the beginning of this year, with a further reduction of 1d. to large consumers. The price is now only 2d. per 1000 c.ft. more than before the war.

Colchester Gas Company.—At the recent meeting of the Company, the Directors recommended the payment of a dividend at the rate of 10 p.c. per annum on the "A" shares and 7 p.ct. per annum on the "B" shares. The cost of the Colchester Gas Act, which was Royal Assented last August, amounted to £3616. During the past half year, there was an increase in sales of gas of 7 p.ct. as compared with the corresponding period of the previous year. Under the new Act, the Company was changed, as from Jan. 1 last, from a maximum-dividend into a sliding-scale undertaking.

Weymouth Consumers' Gas Company.—The report adopted at the half-yearly meeting of the Company last Thursday stated that the quantity of gas sold in the six months ended Dec. 31, though not quite up to the level of that for the corresponding half of 1915, was very satisfactory, considering the reduction by the Summer Time Act of the number of lighting hours, and the restrictions placed upon lights under the Defence of the Realm Act. There were 74,717,200 c.ft. accounted for, which compared with 78,290,800 c.ft. for the similar period of the previous year, and was a decrease of 4·56 p.ct. Consequent upon this decrease, the gas-rental was £625 lower. There was, however, some improvement in the returns from meter and stove rental and from residual products; and this, coupled with the saving in expenditure on coal, had a neutralizing effect. There was a balance of £8236 on net revenue account, out of which the Directors recommended the payment of a dividend on the ordinary stock for the half year at the maximum rate of 5 p.ct. per annum (less income-tax). During the whole of 1916, the gas sold was 147,775,600 c.ft., against 154,321,900 c.ft. in 1915, a reduction of 4·24 p ct. Manufacturing results, when compared with the last December half year before the war, had greatly improved. Though more gas was sent out in 1916 than in 1913, the quantity of coal used was 556 tons less; the sale of gas per ton having risen from 10,718 to 11,814 c.ft.

INTERRUPTED GAS SUPPLY AT HAVERHILL.

In consequence of a breakdown at the Haverhill Gas-Works, the Urban District Council a fortnight ago gave warning that the supply of gas would be discontinued until further notice. This intimation was made in the Press last Wednesday week; and it was stated that the town had then been without gas continuously since the previous Friday morning. Housekeepers and others were, naturally, much inconvenienced.

Reports of meetings of the Gas Committee, which were submitted at the subsequent monthly meeting of the Urban District Council, showed that on the 7th inst. the Manager (Mr. F. C. Troughton) explained that, in consequence of some of the mains at the works being choked, and the demand for gas being in excess of the make, he could not get any stock; and that he was unable to continue the supply, pending the clearing-out of the mains. The Committee instructed the Manager to clear the mains at once, and do his utmost to supply the consumers on the following day. At a meeting on Feb. 9, the Manager reported that, after clearing-out some of the pipes and obtaining a supply of gas, the exhauster had broken down; and in consequence of other defects, he was unable to bye-pass the gas into the holder, and must consequently shut-down and stop making gas until he had thoroughly overhauled all the mains in the yard. The Committee instructed the Manager to obtain another exhauster at once, and to complete the cleaning of the mains and other work. At a further meeting held on Feb. 14, a special report, explanatory of the cause of the failure, was received from Mr. Troughton; and it was resolved to recommend that an expert gas engineer be called in to report upon the condition of the works generally.

Mr. T. JARVIS proposed the adoption of the reports, stating that a good many of the troubles were only revealed when the failure came about; and they had to open-up to ascertain where the troubles were. Most of the defects were below the surface. Mr. Troughton, as far as he had seen, had done everything humanly possible to bring about a reasonable condition of things, and give the townspeople light. It was an unfortunate set of circumstances. If the new Manager had known when they offered him the situation what he knew to-day, he would probably never have accepted the place.

Mr. F. D. UNWIN said they had been showing big profits and "cracking-up" the gas-works; and as soon as the works were tested strongly, they failed. They had been paying big income-tax year by year on the profits, when a large amount of the money ought to have been spent in keeping the works in thorough repair. The town had put up with it during the past week; but it must not occur again. It was a question of a large number of people being thrown out of employment; and it was a great loss to manufacturers as well as to the labouring classes as a whole, that during the previous ten days some men had not been able to do an hour's work. He could congratulate the Manager upon the way he had tackled the business, and was glad the Chairman of the Gas Committee (Mr. Jarvis) had exonerated him from all blame.

Mr. J. BADCOCK said he considered the Gas Committee ought to have seen into the matter earlier; no private individual would have allowed it to occur.

Mr. S. L. BIGMORE, after commenting on the failure and loss, said he considered the only way to get out of the difficulty was to engage an expert gas engineer. At a meeting of the Gas Committee, Mr. Troughton had expressed a wish that this should be done.

The reports were approved.

In justice to Mr. Troughton, we reproduce the special report by him to the Committee which is referred to above:

On Wednesday last the gas supply failed. This was due to excessive back-pressure caused by blockages of tarry matter and some naphthalene in the mains between the condensers and purifiers. The presence of naphthalene was due to the very severe frosts we have experienced during the last month. Had I been able, I should have bye-passed the condensers during this period, which would have prevented the naphthalene being thrown out of the gas through being too rapidly cooled. I was unable to do this; there being an insufficient number of valves to carry out the operation. It is advisable that this should be rectified, as another benefit would be obtained—*i.e.*, being able to clean-out the condensers without having to stop making gas. The present type now being inadequate for the increased make, this necessitates them having to be cleaned-out every four or six weeks. The tarry matter had been accumulating in the mains for the best part of twelve months, and should have been removed during the summer, when the consumption of gas is comparatively low. During the time I have been here, I have not been in a position to clear these mains, the consumption of gas being more than I could cope with owing to a restricted output caused by the inefficiency (through disrepair) of nearly every item of the plant on the works, together with the blockages in the mains. These blockages I cleared out as well as I could in the time at my disposal, as it was important to have a supply of gas available for water-pumping operations on the 8th inst. In the course of ten years' experience I have not known of a gas-works having to drag the mains as I have done this week. The reason for this being necessary here is the fact that there is not a sufficient fall to the syphon-pots.

In two instances, I found mains to be dead-level. They were almost full of tarry matter, which must have been accumulating for several years, as it was most difficult to get at; and I should not have located it, had I not taken out the exhauster connections. On Friday morning the exhauster broke down; and the duplicate machine could not be got to work. I could not get gas to the holder without one of the machines owing to the bye-pass pipes above mentioned being almost choked up. I was very surprised at the condition of these pipes, and consider it necessary to make adequate provision for cleaning-out in future. Several valves are in such poor condition that they should be repaired or replaced by new ones as favourable opportunities occur.

The liquor pump and one of the boiler-feed pumps are now being repaired, and the existing boiler-feed pump requires to be replaced as soon as possible so that it also can be repaired. It may fail at any time. The two tar-pumps require overhauling. I have no drawings of any part of the plant or mains; no record of dimensions or capacity of the tar and liquor wells.

Under the circumstances, I may say that I feel that no blame can be attached to me, as, owing to the season and general conditions, I could not carry out extensive repairs at the same time keeping a supply of gas on the town. The gas supply has failed twice in the short time I have been here. This is damaging to my reputation and future prospects in the gas profession, if all the facts are not made known; and I ask you to take the necessary steps to counteract this by publishing my report in the Press.

PRICE OF SULPHATE OF AMMONIA.

Circular-Letter to Makers.

With reference to the fixing by the Government of the selling price of sulphate of ammonia for home consumption, as intimated on p. 311 of the "JOURNAL" for Feb. 13, the following circular-letter, signed by Mr. D. Milne Watson (the Chairman of the Sulphate of Ammonia Advisory Committee), has been issued to makers.

84, *Horseferry Road, London, S.W.*,
Feb. 12, 1917.

Dear Sir,—You will remember that at the meeting of sulphate of ammonia makers held on Nov. 28, 1916, at these offices, to which all makers of sulphate of ammonia were invited, the under-mentioned Committee was appointed to consider "how the agricultural needs of the country with regard to sulphate of ammonia can best be met at the present time." After several meetings, this Committee (which has come to be known as the "Equalization Committee") succeeded in drafting a scheme which would enable makers in agricultural districts to sell the whole of their make for home consumption, but at the same time give them a fair share in the higher prices obtainable for export, and thus secure that the needs of the country would be met in the most economical manner. In the meantime, the change of Government occurred; and the new Food Controller appointed the individual members of the Equalization Committee to act as an Advisory Committee to the Ministry of Food with regard to questions affecting the production and distribution of sulphate of ammonia.

In view of the complaints of agriculturists regarding the difficulty in obtaining sulphate of ammonia, and the pressure they were bringing to bear on the new Agricultural Departments of the Government to reduce the price, it was necessary, firstly, to show the Government that sulphate of ammonia makers had a plan ready to deal with the situation, and, secondly, to make every effort to secure that due consideration should be given by the Government to manufacturers' interests. The scheme was, therefore, submitted to the Food Controller; and a number of meetings were held at which the interests of both agriculturists and manufacturers were fully and frankly discussed.

As a result, at a final meeting held on Feb. 10, the Advisory Committee were informed that the War Cabinet, having considered the whole question, had decided that, on or after Monday, Feb. 12, 1917, sulphate of ammonia is to be sold at the price of £16 per ton, 24½ per cent. basis, in maker's bags, net cash, delivered at the consumer's station in any part of Great Britain and Ireland. The price to consumers who take delivery at maker's works for conveyance otherwise than by railway, to remain at £15 10s. per ton on the above terms. Further, that the Government were prepared to pay to the Advisory Committee 10s. per ton in respect of every ton of sulphate of ammonia sold, on or after Feb. 12, 1917, for home agricultural use, at not exceeding £16 per ton as above, if railed to consumer's station.

The Food Controller lays on the Advisory Committee the obligation to give effect to an approved scheme for regulating the distribution of supplies to farmers in all parts of the United Kingdom, and has approved of the general principle embodied in the scheme submitted to him by the Equalization Committee. This scheme will be circulated among makers as soon as the modifications rendered necessary by the new prices have been introduced into it. The most important of these modifications will be a provision for equalizing the amount of railway carriage payable by each maker.

The Advisory Committee will advise the Food Controller as to the works from which it is advisable that sulphate of ammonia should be exported, in the event of further export being permitted at some future date. In the meantime, in view of the fact that all export has been stopped, we advise every manufacturer to book all orders which do not involve payment of more than 10s. per ton railway carriage. Where the carriage exceeds 10s. per ton, they should first communicate with the Secretary to the Sulphate of Ammonia Advisory Committee, No. 84, Horseferry Road, London, S.W. Makers should, in every case, apply to the head rates office of railway companies for the rates—these are more likely to be correct than those quoted locally.

Railway accounts will have to be produced when claiming a share in the Government contribution to the Advisory Committee, and should, therefore, be preserved. An announcement will be made in due course as to when claims are to be sent in.

The above-mentioned prices are defined as the retail prices to be charged by both manufacturers and merchants to consumers for cash.

In view of the important part played by corn and manure merchants, manure mixers, and farmers' co-operative trading societies as distributors, and the large extent to which sulphate of ammonia makers will be dependent on their goodwill after the war, the Advisory Committee recommend that, as heretofore, 10s. per ton should be allowed to these traders on the above prices.

The new prices apply only to sales made on or after Feb. 12, 1917.

In conclusion, we feel we can confidently appeal to all manufacturers for their loyal support and co-operation in giving effect to the new regulations, which should still further popularize sulphate of ammonia among farmers.

D. MILNE WATSON,
Chairman, Sulphate of Ammonia Advisory Committee.

Names of the Members of the Committee: Mr. D. Milne Watson (*Chairman*), Mr. Wm. Fraser, Mr. E. J. George, Mr. W. R. Hann, Mr. N. N. Holden, Mr. A. K. M'Cosh, Alderman F. S. Phillips, Mr. A. Stanley, and Mr. F. C. O. Speyer (*Secretary*).

The Masking of Public Street Lamps.—At the meeting of the Westminster City Council last Thursday, the Gas Light and Coke Company asked for a review of the charge of 3d. and 6d. each for altering the masking of the small and large public street lamps in the district, in view of the labour entailed in removing the existing distemper. They stated they were unable to do the work at less than 1s. and 1s. 6d.; but if it was found that this charge was more than the actual cost to them, they undertook to give the Council the benefit of any saving that might be shown. The Council accepted the suggested increase in charges, which it was estimated would involve an additional expenditure of £150.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 26.

There is fair inquiry for pitch, and a certain amount of business continues to be done. Makers' price to-day is 25s. per ton net in bulk at makers' works. The position of creosote remains unchanged. Solvent naphtha is steady at about 2s. 3d. per gallon net and naked for 95/160 quality. In other products values generally are the same as last recorded.

In sulphate of ammonia, there is a strong demand for agricultural purposes in the home market at fixed prices. All exports are now prohibited.

Tar Products in the Provinces.

Feb. 26.

There is no alteration in the markets for tar products. Pitch is still very difficult to sell. Solvent and heavy naphthas are steady.

The average values of gas-works products during the past week were: Gas-works coal tar, 20s. 3d. to 24s. 3d. Pitch, East Coast, 16s. to 17s. per ton; West Coast—Manchester 15s. to 15s. 6d., Liverpool 16s. to 16s. 6d., Clyde 17s. to 18s. Benzol, 90 p.ct., North, 10½d. to 11½d.; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3⅛d. to 3⅜d. Heavy oils, in bulk, North, 3⅜d. Carbolic acid, 60 p.ct., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 80s., bags included. Anthracene, "A" quality, 3d. per unit; "B" quality, 1½d. to 2d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Feb.* 24.

There has not been any change in the situation during the past week; business being at a standstill and prices being quite nominal for export. The value for agricultural purposes remains £15 10s. to middlemen and £16 per ton to farmers, net cash, in makers' bags, delivered at the consumers' station in any part of Great Britain and Ireland.

Nitrate of Soda.

The market for this material has continued on its upward course, and holders on spot now require 23s. 3d. per cwt. for ordinary quality and 23s. 6d. for refined.

Sulphate of Ammonia.

From another source we learn that no prices are quoted for export.

COAL TRADE REPORT.

Northern Coal Trade.

There is a steady demand for coal; but the extreme scarcity of steamers and the high rates that are quoted for freights are limiting the new business. In the steam coal trade, the tone is a little better; but some collieries are only able to obtain partial work. For best Northumbrian steam coals, the current quotation is 30s. per ton f.o.b.; for second-class steams, the market price varies from about 23s. to 25s.; and steam smalls are quiet at from 16s. 6d. to 20s., according to class. A renewal of the Norwegian trade is expected. In the gas coal trade the demand is still full, though for lighting the consumption is now beginning to fall. Prices do not show so much variation this week. Best Durham gas coals are about 25s. 6d. to 26s. 6d. per ton f.o.b.; for second-class qualities, the quotation is near 19s. to 20s.; and "Wear specials" are rather irregular, at perhaps from 28s. to 30s. per ton. These prices are, however, accompanied by the fact that much of the quantity delivered is on contracts, with "limitation" figures of value. Little is doing in new contracts for gas coal, though the usual time for some for Scandinavia is near at hand. Freights are higher, both for coal and coke. Over 17s. is quoted for coal Tyne to London; and the record figure of 53s. 3d. has been paid for coke from the Tyne to Rouen. Gas coke is in steady demand for export at about 32s. to 33s. per ton f.o.b. For home use, however, difficulty in getting cartage is impeding delivery in some places.

Women lamplighters will shortly be seen in the suburban districts. They are, it is reported, being shown round in South London.

The Southend Corporation have decided that the price charged for gas supplied from the Leigh Gas-Works shall be increased from 3s. 4d. to 3s. 6d. per 1000 c.ft.

It was stated at the recent meeting of the National Steam-Car Company, Limited, that there is a great future for coke-fuel steam-motor vehicles, and that according to reports from users they have proved highly satisfactory and economical. With coke at 25s. per ton and petrol at 2s. per gallon they show a saving of about 1d. a mile. It was added that the coke-driven car is a great advance on all previous steam-propelled vehicles, and that the Government authorities have authorized their manufacture on a considerable scale.

Last Sunday week, there was an outbreak of fire, the cause of which was unknown, in the pump-house at the Low Moor Gas-Works, Bradford. The house is a fairly large building; and by the time the fire brigade arrived the flames had gained a good hold. The brigade concentrated their efforts to confining the fire to the pump-house; and in this they were successful—there being a plentiful supply of water obtainable from the gasholder tanks. The roof of the pump-house was destroyed, and the interior wrecked. A good deal of machinery was also damaged.

Suitable for use in all Modern Interior Coal Grates.

Artistic Gas Fires.

THERE are many of them, of course, but have you studied the "St. Nicholas" types?

The "St. Nicholas" Gas Fire is a happy combination of the three essentials:

Effective Radiation.
Effective Ventilation.
Effective Appearance.

And the result is *the* Gas Fire.

Low in Price and Easy to Fit.

Designed and constructed by

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, **EDMONTON, N.**; Gothic Ironworks, **FALKIRK**; and Gothic Works, **BIRMINGHAM.**
SHOWROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, **GLASGOW**; 83, Old Market Street, **BRISTOL**; 18, Severn Street, Deansgate, **MANCHESTER**; 97, Millfield, **BELFAST**; 333, Queen Street, **MELBOURNE**; and 12, Cunningham Lane, Pitt Street, **SYDNEY, N.S.W.**

Salisbury Gas Light and Coke Company.

Mr. George Fullford, J.P., the Chairman, presided at the half-yearly meeting of the Company last Wednesday, and, in proposing the payment of the maximum dividends, said coal had increased in price, gas oil had gone up nearly 400 p.ct., and there was a shortage of men and material, and increased cost in every department. Over 2000 yards of 20-inch main had been laid during the half year through the city to Milford Hill. Great difficulties had been met with and overcome by their Engineer (Mr. W. Fielden). In one instance they had to go under the bed of Summerlock stream, and cross Fisherton Bridge, over the River Avon, with a 20-inch steel tube. In the manufacturing department, they had laid down two 50,000 c.ft. per hour combined sets of engines and exhausters. There was a good increase in the output of gas. Residuals had done well; and he could heartily congratulate the shareholders on the position of the Company, which was due to the energy of Mr. Fielden, whose endeavour was to keep the works in line with the most modern practice.

Heavy Leakage at Pontypridd.—Last Tuesday the financial position of the gas-works and electric light and tramways departments was considered by the Pontypridd Urban District Council. The electricity department reported a net profit for the year of £374, as compared with a loss of £181 in the previous year. The gas-works undertaking showed a net loss on the year of £905, as compared with £743. The leakage of gas amounted to 27,654,763 c.ft. Mr. Hopkin Morgan commented on this loss of gas, and remarked that it was practically one-fifth of the output. No business could thrive in this way. The Chairman pointed out that colliery subsidences accounted for a good deal of the leakages in the district. Mr. E. H. Swain, the Gas Engineer, pointed out that neighbouring undertakings were not so well off in this respect.

Losses on the Tredegar Gas Supply.—At the last meeting of the Tredegar Urban District Council, the Gas Manager (Mr. D. W. Davies) reported that the make of gas for the current month would likely be the heaviest on record. He said he made a special report two or three years ago; and it was so strong that he was threatened with dismissal. The report was, however, fully justified. He firmly believed that in ten years' time Tredegar would be worse off than the Rhondda Valley. He estimated that in ten years the Council would lose £10,000. He attributed the bulk of the loss of gas to be due to breakages in the mains, which were old in some cases, and in other cases were in the sewer trenches. Mr. Lewis Evans said the Council did not know their real loss. Another £10,000 put to the £10,000 which they were said to be losing would go a long way towards installing an electric light system. Then they could scrap the gas system, on which they were losing money. It was decided to write the local Chamber of Trade (a letter from whom had given rise to the discussion) that the supply of gas was now improving.

Unprecedented Sale of Gas at Bristol.

When submitting to the proprietors the accounts for the year 1916, the Directors of the Bristol Gas Company stated that they considered them satisfactory, in the circumstances of labour scarcity, high prices of coal, oil, &c., and difficulties in obtaining delivery. The price of gas was reduced 2d. per 1000 c.ft. from June 30 last. The balance on revenue account (£86,851), with the £90,775 brought forward from the previous account, allowed—after providing for interest and dividend for 1916, in addition to £9445 for depreciation of investments to market value—a balance of £84,674 to be carried forward to the credit of the current year. The Directors recommended a dividend for the past six months at the rate of 5 p.ct. per annum, less income-tax. At the meeting, the Chairman (Mr. Fenwick Richards) said during January there had been an unprecedented sale of gas. On fourteen consecutive days 28,000,000 c.ft. had been sold, or 2,000 000 c.ft. more than the average. So far, February was equally satisfactory; and he hoped that these results would almost compensate for their 1916 losses. The residual products showed satisfactory returns. Coke was £22,000 up on the previous year, breeze a little down, and ammoniacal liquor £10,000 to the good—figures which he thought would be considered satisfactory by the proprietors. The Directors would invest as much as they possibly could of the Company's money in the War Loan. They had left it to the last moment, so as to see to the exact position of their accounts.

Dundalk Electricity Undertaking.—Recently the Dundalk Urban District Council applied to the Local Government Board for sanction to a loan of £5000 for the extension of their electricity works; the matter being referred to at the time in the "Electricity Supply Memoranda" [*ante*, p. 247]. The Board have assented to a loan for £3000—pointing out that the Council have no power to borrow the other £2000, and that it is the clear duty of the Council to provide for balancing the working account of the undertaking by an addition to the local rates of about 10d. in the pound.

Cardiff and the Calorific Standard.—When the Cardiff Electric Lighting Committee considered the application of the Gas Company to the Board of Trade for a Calorific Standard Order, Alderman Illtyd Thomas said that, while they must agree to assist the Ministry of Munitions, he did not think the Government ought to encourage the continuation of the reduction of luminosity for such a long period as five years after the war. The poorer classes who could not afford incandescent mantles would be seriously affected, particularly the children, whose eyesight would be strained and possibly impaired. He suggested that when the Chairman and the Lord Mayor were next in London they should see Lord Rhondda, who, as President of the Local Government Board, was interested in child welfare. It was decided to oppose the Order, in conjunction with other corporations, and to adopt Alderman Illtyd Thomas's suggestion.

WE SUPPLY
"CRUDE BENZOL PLANTS"
FOR WORKS CARBONISING
"30 TONS OF COAL"
PER DAY, AND UPWARDS.
R. & J. DEMPSTER, Ltd.,
MANCHESTER.

Derby Gas Company's Increased Profits.

An encouraging record of results achieved during a period of abnormal difficulty was presented at the annual meeting of the Derby Gas Company, held on Friday, under the presidency of Alderman J. W. Newbould, J.P., who said that, despite the continuance of the war, they might congratulate themselves upon the results obtained during a year of great anxiety. The balance-sheet showed an unusual item of £5131, for the purchase of additional lands required for special purposes. The usual procedure would have been for the Board to have promoted a Bill in Parliament to obtain power for acquiring the land. But this was a slow proceeding; and, as the matter was urgent, their Solicitors decided to apply to the Under-Secretary of State for a licence in mortmain under a Royal Warrant, which, under the special circumstances, was duly granted. The necessary plant had been ordered; and but for the inclement weather it would probably have been erected. The sale of gas for the year showed a small decrease of 1·9 p.ct. compared with the previous twelve months. The actual figures, in millions of cubic feet, were 1078 for 1916 and 1098¾ for 1915. This result the Directors considered eminently satisfactory, especially in view of the present lighting restrictions. The average price charged for gas during the year was slightly over 2s. 2d. per 1000 c.ft.; being only 3d. more than before the war. The outstanding feature in the accounts was the returns for residuals, which, after deducting all expense of manufacture, carriage, &c., amounted to £82,185; being the substantial increase of £17,189 upon the previous year. Special attention had been paid for some years to the profitable utilization of the secondary products; and the Directors were gratified that their efforts in this direction had resulted in such a substantial sum. Coals had cost £90,377; being £12,233 up on the previous year for practically the same tonnage. As the balance-sheet disclosed, the profit for the year amounted to £40,218, to which must be added the interest on investments and bank account of £1488, making a total of £41,706, as compared with £34,352 for the previous year. There remained a balance of £20,368. This, with the balance of £58,706 brought forward, made a total of £79,074 available for dividends. The Directors recommended the payment of a dividend upon the ordinary consolidated stock at the rate of 5 p.ct. per annum for the half year, with an additional ½ p.ct. for the twelve months, making 5½ p.ct. for the year, less income-tax, which would absorb £11,076, leaving £67,988 to be carried forward. The report was adopted.

Otley Gas Company.—The report of the Directors for the year ended Dec. 31 states that a profit of £3029 was made. This, along with £11,442 brought forward, gives a total of £14,472. Allowing for the payment of mortgage and debenture interest and interim dividend, there remains £12,886, out of which it is proposed to pay a dividend at the rate of 6 p.ct. per annum on the ordinary stock, less tax (making 5½ p.ct. for the year), carrying forward £11,328.

Welsbach Light Company's Scheme.—The Welsbach Light Company, Ltd., have been officially informed that the exchange of securities referred to in the scheme recently approved by the share and stock holders, and by the Courts and Government Departments, has been effected at Berne, with the result of eliminating alien enemy interests. In accordance with the scheme, 83,048 out of the 173,048 Welsbach shares acquired by the Company in the exchange will be offered to the share and stock holders on favourable terms; the remaining 90,000 shares so acquired being retained unissued.

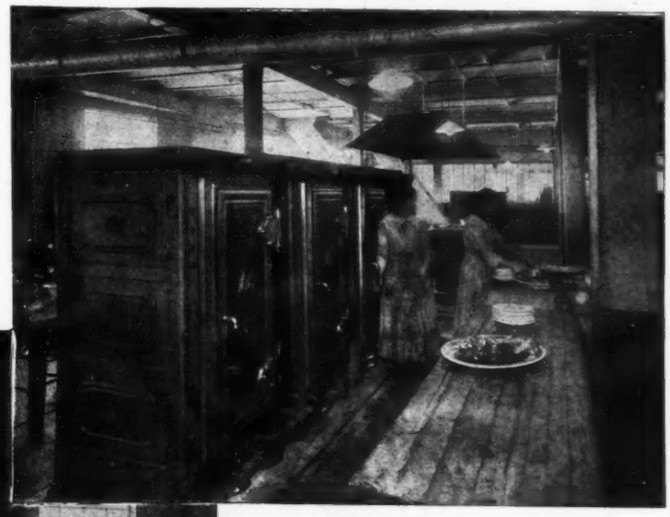
Sheffield Gas Company's Excellent Management.—In a review of trade conditions and of work done, Mr. Peter M'Gregor, the newly-elected President of the Sheffield Chamber of Commerce, said that the Chamber had appointed a Committee to deal with the question of the gas supply, which was becoming of increasing importance to the works in the city. Owing to the constitution of the Company and its excellent management, Sheffield had enjoyed in the past a gas supply of such quality, and at such a price, that a very great inducement had been offered to manufacturers to adopt its use in their works; and at the present time there were gas-engines, hardening and tempering furnaces, and so on, being adopted in an increasing degree. This threw a heavy responsibility upon the Gas Company. The Chamber did all in their power to help them in obtaining better supplies of coal. It was quite an easy matter to find fault; and, indeed, it was possible that there had been faults on both sides. But he felt emphatically that the management of the Gas Company had the interests of the town at heart, and would do all in their power to sustain the reputation that they had secured in the past, and that they should do all they could to render them help in all directions—more particularly in their attempt to obtain labour.

East Grinstead Gas and Water Company.—The accounts of the Company for the past year showing an available balance of £8147, dividends were declared at the annual meeting last Thursday of 9 p.ct. on the "A" stock and "A" shares, and £6 6s. p.ct. on the "B" and "C" shares—less income-tax. In the course of his remarks, Mr. P. E. Wallis (who presided) said there had been a considerable increase in the use of gas-fires, which to some extent compensated for the decrease in that used for lighting. They were now engaged in further extensions at the works for securing an increased supply of benzol and toluol, and would shortly have the complete apparatus in full work. Notwithstanding the great increase in cost of all materials, they had managed to keep expenses at about the same level as the last few annual amounts. Receipts for gas were considerably reduced; but, under all the circumstances, the results of the year's working might be considered satisfactory. Of their ordinary staff of about 27 men, no fewer than 23 had gone to serve the country since the war began. Falling into line with other progressive undertakings, the Company had applied to the Board of Trade for an Order to adopt the calorific power standard in place of the old illuminating power test. The Draft Order had been submitted and approved; and they expected soon to have it completed and in operation.

ARDEN HILL'S

Gas-heated

COOKING, HEATING, & HOT-WATER APPARATUS



FOR CANTEENS, HOSPITALS, &c.

New fully illustrated List now ready. — Write to

ARDEN HILL & CO.,
Acme Works,
BIRMINGHAM.

Belfast Gas Price.—It is announced that the price of gas in Belfast will be increased 5d. per 1000 c.ft.

Settle Gas Company.—The annual report of the Settle Gas Company, presented last week, was stated to be very satisfactory, considering the times and conditions. Despite events, the Company had been able to maintain the pre-war charge for gas, while paying the usual dividend. After payment of a dividend of 4 p.ct. (less tax) on the cumulative preference shares, and of 10 p.ct. (less tax) on the ordinary shares, there was left a balance to carry forward of £1023. The Manager (Mr. John Handby) and the staff were congratulated on the position.

Smaller Sales at Rossendale and Bacup.—At the half-yearly meeting of the Rossendale Union Gas Company, the Directors reported that the sale of gas showed a decrease of 13·15 p ct., compared with the quantity sold in the corresponding period of 1915. The receipts on revenue account were £21,354, and the expenditure £17.449, showing a balance of profit of £3905. In the profit and loss account, there was a balance of net profit (subject to the half year's dividend) of £7456. The Directors recommended the payment of the statutory dividends.

Smoking in a Gas-Works.—"It might lead to a serious explosion; persons in other parts of the country found guilty of this offence have been sent to prison without the option of a fine," said Mr. Simmons, Chairman of the Wolverhampton Munitions Tribunal, in fining two youths 20s. for smoking in the boiler-house at a South Staffordshire gas-works on the 9th inst. The prosecuting firm considered it as a dangerous thing having regard to the explosive nature of the gas manufactured on the premises. Defendants had been previously warned, and notices were posted in the works against smoking.

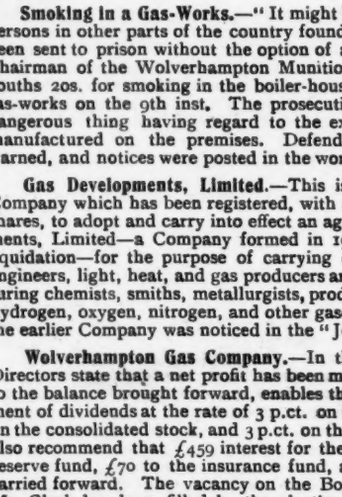
Gas Developments, Limited.—This is the title of a joint-stock Company which has been registered, with a capital of £20,000 in £1 shares, to adopt and carry into effect an agreement with Gas Developments, Limited—a Company formed in 1915, and now in voluntary liquidation—for the purpose of carrying on business as mechanical engineers, light, heat, and gas producers and manufacturers, manufacturing chemists, smiths, metallurgists, producers and manufacturers of hydrogen, oxygen, nitrogen, and other gases, &c. The registration of the earlier Company was noticed in the "JOURNAL," July 13, 1915.

Wolverhampton Gas Company.—In their half-yearly report the Directors state that a net profit has been made of £7814. This, added to the balance brought forward, enables them to recommend the payment of dividends at the rate of 3 p.ct. on the preference stock, 5 p.ct. on the consolidated stock, and 3 p.ct. on the new ordinary stock. They also recommend that £459 interest for the half year be placed to the reserve fund, £70 to the insurance fund, and the balance of £38.599 carried forward. The vacancy on the Board caused by the death of Mr. Clark has been filled by the election of Mr. W. P. Gibbons, of Dudley.

Fatality at the Falmouth Gas-Works.—William Forward (aged 30), who was engaged in carrying coal from the railway station at Falmouth to the gas-works, died some days ago as the result of being crushed between a cart and a pillar at the works. At the inquest, the Coroner (Mr. E. L. Carlyon) said it appeared that deceased was coming down the hill holding the brake; and seeing that an accident was inevitable, by putting on the brake he hoped to stop the cart. It was a case of "familiarity breeding contempt," because if only the man had used the chain weight that had been provided for the purpose, the accident would not have happened. The Gas Company were not in any way responsible.

Bath Gas Company.—At the annual meeting last Wednesday of the Bath Gaslight and Coke Company, the Directors reported that there had been a further increase in the cost of coal during the year, and, by reason of the restricted street lighting and the Summer Time Act, a falling off in the consumption of gas. But, assisted by better returns for residuals, any increase in the price of gas (which still remained at 2s. per 1000 c.ft.) has for the present been avoided. At the request of the Government, the Company are extracting benzol and toluol from the gas for the manufacture of explosives. The Company have applied to the Board of Trade for an Order under the Gas (Standard of Calorific Power) Act, 1916, for the substitution of a calorific value standard for the present illuminating power standard. Up to the present time, 121 of the Company's employees have gone on active service. An interim maximum dividend of 5 p.ct. per annum, less income-tax, was paid in August last; and the Directors recommended the declaration of a dividend at the same rate for the half year ended Dec. 31.

Fortunate Coal Purchases at York.—The Chairman (Mr. Alfred Procter), in moving the adoption of the report and accounts for the past year at the meeting of the York Gas Company last Thursday, said they had been fortunate in the matter of coal, owing to having made extensive purchases in the earlier periods of the war at prices then current. But the proprietors must not lose sight of the fact that they would soon begin to feel the full effect of the rising cost of coal and oil. There was one item of expenditure to which he called special attention, and that was a reduction of £2282 in carbonizing wages. This was a direct result of the installation of the labour-saving machinery for stoking and coke-handling; and it afforded abundant justification of the policy of the introduction of machinery into the works. Mechanical stoking plant was introduced soon after the commencement of the war; and there could be no doubt that without it they would not have been able to maintain a full supply of gas. In the year 1916 the total consumption of gas was 523,159,000 c.ft.; being 32,605,000 c.ft., or 5·8 p.ct., less than in 1915. The private consumption was 17,000,000 c.ft. more than in 1913—the last pre-war year. Compared with the previous year, the expenditure had increased by £7212, the receipts by £8072, and the profits by £860. A dividend of 2 p.ct. on the stock and of £3 12s. p.ct. on the consolidated ordinary stock was agreed to.



The "Positive"

"THE METER OF MANY MERITS."

SAWER & PURVES, BRANCH OF METERS LTD.

MILES PLATTING, MANCHESTER.

RADFORD ROAD, NOTTINGHAM.

Agent for Scotland: JNO. D. GIBSON, 2, CAUSEYSIDE STREET, PAISLEY.

Reduced Consumption at Bishop's Stortford.

The Directors of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company, in their report for the six months ended Dec. 31, state that, compared with the corresponding period of the previous year, the sale of gas shows a reduction of 9,978,000 c.ft., or 15 p.ct., and the revenue from residual products a reduction of £138. The complete cessation of all public and outside lighting during the half year, and the reduction in consumption caused by the Summer Time Act, have contributed to this serious diminution of business. After providing for interest, income-tax, and all other charges, a balance of £2219 is placed to the credit of the profit and loss account. Subject to confirmation by the proprietors, the Directors have transferred from the reserve fund to the credit of the profit and loss account the sum of £1039. They recommend the declaration of dividends at the statutory rates, which, with income-tax, will absorb the whole of the balance remaining to the credit of the profit and loss account, amounting to £3062. The continued advance in the cost of manufacture has rendered necessary a further increase in the price of gas, which was raised 2d. per 1000 c.ft. as from Dec. 31. In accordance with the terms of the sliding-scale contained in the Company's Act, the dividends payable to the proprietors will be reduced, as from Jan. 1. At an extraordinary general meeting, there will be submitted a resolution to authorize the Directors to issue £5000 of 6 p.ct. redeemable debenture stock, in order to provide further working capital. This forms the balance of an issue which received the sanction of the Treasury in 1915.

An Anxious Year at Ipswich.

Addressing the proprietors at the annual meeting of the Ipswich Gas Company, the Right Hon. Sir Daniel F. Goddard, M.P. (the Chairman), said the whole of the work had been dominated by the war; and one of their greatest difficulties had been the supply of coal. They had never absolutely run short; but they had been very near to it on several occasions. He testified to the goodwill of their contractors, who had sometimes done more than they were bound to do, in order to help the Company out of a hole. They had had to resort to some strange practices to get their coal; and at times they had had to use hulks which had been towed from the Tyne to Ipswich—a rather risky undertaking, when the seas were covered with dangerous implements of war. As an indication of some of their difficulties, he said that in 1913, the last complete year before the war broke out, the cost of freight was somewhere about 3s. 6d. per ton, a total of £6700; but last year it had cost no less than £21,280. The difficulty of getting ships to bring the coal had led the Directors to consider very seriously the question of purchasing a steamer for themselves; but they had been deterred by the high cost of vessels, which was about three times their normal value, and the danger of it being commandeered by the Admiralty when they had purchased it. Last year they carbonized 39,728 tons of coal, an increase of 1185 tons over the previous year; and the average price had been 29s., against 21s. 4½d. last year. They had sold 567,000,000 c.ft. of gas, an increase of 28,250,000 c.ft. on the year. It was a wonderful figure, especially when they considered that there had been no public lighting, and that the shops had been compelled to close earlier. On the top of this, there was the Summer Time Act. They had gone into the latter as carefully as possible, and found that it had cost them something like a 6½ p.ct. reduction in output. They would all agree that the coal they had used had been used well, because they had made 13,151 c.ft. of gas per ton, as against last year's 12,672 c.ft.—an increase of 479 c.ft. Upon this, they congratulated their Manager (Mr. Frank Prentice) and his staff. Early in the year they gave a war bonus to the men, on account of the high cost of living, and later on a still larger bonus. They wished to treat the men as generously as possible; and he would take the opportunity of saying that the employees had been absolutely loyal and true throughout all the strain, and owing to the shortage of labour had done work which in ordinary times they would not have done. Dealing with the co-partnership fund, he said he referred to it with regret. The scheme was started when they were on the high tide of prosperity, and hoped to further reduce the price of gas. But unfortunately they had had to increase it; and therefore the bonus to the men had been decreased, just as had the dividends to the shareholders. The scheme had been in operation less than three years; but already 60 of the employees were shareholders. The allowance to employees on service amounted to £564. Ninety of the men had joined the forces. The balance to the profit and loss account was £8308, as against £12,824 last year. To meet interest and dividend charges required £10,458, leaving a deficit on the year's working of £2003. They had, however, a nice little sum being carried forward. The report was adopted; and dividends were declared at the rate of 12½ p.ct. on the "A" stock, 10 p.ct. on the "B" stock, and 9½ p.ct. on the "C" stock—less income-tax.

Satisfactory Results at Blyth.—It is stated by the Directors of the Blyth Gas Company in their report that the results of the past year's working were satisfactory. The revenue was £26,068, and the expenditure £20,646, leaving a balance of £5422 as the profit for the year. The balance standing to the credit of profit and loss account is £7270, out of which the Directors recommend the payment of a dividend for the past half year on the ordinary stock at the rate of 6½ p.ct. per annum, less income-tax. This will absorb £2180, leaving a balance of £5090. This amount is subject to £1496 being divided equally between the insurance and renewal fund accounts, leaving a net balance of £3594 to the credit of profit and loss account. The interim dividend for the half year ended June being at the same rate makes the dividend for the year 6½ p.ct., less income-tax, this being the maximum allowed. The revenue account shows an increase in receipts, when compared with the previous year, of £1351, and an increase in the expenditure of £1158. Coal, other materials, and labour, have cost more; while, on the other hand, coke has improved in value. Earlier closing of business premises and the Summer Time Act each assisted in accounting for the decrease in the sale of gas. The extension to the carbonizing plant is in a more satisfactory state; and the Directors have assurances as to the completion before another lighting season.

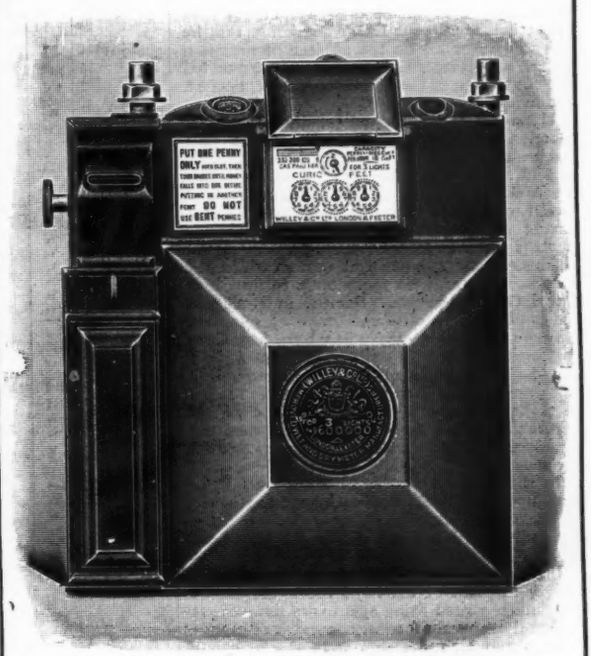
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD.,

Exeter, London, Manchester, Leicester.

Telegrams:
"WILLEY, EXETER."
"GASVILLADO, KINLAND, LONDON."
"METERS, LEICESTER."
"WILMETER, MANCHESTER."

Telephone Nos.:
133 EXETER.
234 DALSTON, LONDON.
4777 LEICESTER.
7419 CITY (MANCHESTER).

LONDON WORKS & OFFICES:
89-95, Hertford Road, Kingsland, N.
LEICESTER:
5, Oxendon Street.
MANCHESTER:
John Street, Booth Street West, S.W.

AGENTS FOR SCOTLAND:
D. M. NELSON & CO., 20, WEST CAMPBELL ST., GLASGOW

Brighton and Hove General Gas Company.—At the meeting next Friday, the Directors will report that, as compared with the half year ended Dec. 31, 1915, there has in the past six months been a reduction of 1·1 p.ct. in the sale of gas; while the revenue from residual products is £512 less. Owing to the serious rise in freight, the cost of coal and oil again shows a large advance, which the increase in the price of gas announced in the last report has not been sufficient to meet. The declaration of dividends at the statutory rates is recommended.

Female Stove-Cleaners at Dundee.—A discussion by the Dundee Gas Committee revealed the fact that this is one of the places where women are employed in cleaning stoves. About a dozen employees made application for an increase of pay to the extent of 2d. per hour. The Manager (Mr. Alexander Yuill) suggested that the men who were employed on the purifiers should get an extra ½d. per hour when thus engaged. This was skilled work; but the men were not wholly employed on it. He explained that he had had to employ women, owing to the difficulty in getting men. Men could get 10d. and 1s. an hour at the docks, and were leaving the works; so that he thought it would be better to save the situation by giving the men he mentioned an extra ½d. The women he was employing were not displacing men, as men could not be obtained. They did not know until now what women were capable of doing.

Price of Tar Oil for Diesel Engines.—It is stated that, in consequence of the great increase in the cost of crude oil for the Diesel engines at the Basingstoke electricity station, the Town Council resolved to accept a tender for converting the three engines so that tar oil may be used. The difference in the present prices of the two oils is about £4 per ton; and on a year's consumption it is estimated a saving of from £400 to £460 will be effected, after paying the cost of converting the engines. The Electrical Engineer has been authorized to accept a tender for 200 tons of tar oil, at a price not exceeding 90s. per ton.

Matlock and District Gas Company.—The revenue account for the year ended Dec. 31, the Directors stated in their report, showed a profit of £3089, to which has to be added an unappropriated balance of £5062 from the previous year. After deducting the interim dividend and debenture interest, the amount at disposal was £6416. Out of this the Directors recommended a dividend for the past half year at the rate of 6s. per share on the paid-up capital, making 5⅛ p.ct. for the year, and carrying forward £4801. It was added that, in common with nearly all other gas undertakings, the Company had experienced a considerable reduction in the sale of gas, and at the same time had had to contend with a largely increased cost of all the commodities used in connection with the business. The inevitable result was a considerable reduction in profits.

STOCK MARKET REPORT.

THE War Loan campaign is closed; and we only await the complete counting-up of the results and their announcement to an eager and expectant public. That it is an immense success we know already from the Chancellor's statement; but there is a craving for sensational and more colossal figures. Already in some quarters speculation is arising as to what form the next appeal to the country for money may take; and Mr. Bonar Law's admission that he has an open mind on the subject of premium bonds, the speculative element in which assailed the conscience of the late Government, opens a wide vista of possibilities.

Upon the Stock Exchange, after the great emotion has fallen a great calm. The past week was about as quiet as could be imagined, and in some lines there was stagnation itself. There was no longer the enthusiastic pressure to sell anything or everything and invest in War Loan; and buyers with any money in their pockets were few and far between. As stated in this column two or three weeks ago, it will take some little time for money to flow into Capel Court channels. But the quietude did not impair the cheerful undertone of markets. Government issues were fairly firm, and Consols were better. The old War Loan figured round 90. Home Rails were dull generally; but prior charges were in some request. Americans shaped better at first, but fell back again before the close. Argentines, after a promising opening, sustained a check. South Africans for the most part were fairly steady.

In the Foreign Market, French were firm, and Japanese and Chinese advanced; but Brazilian recoiled. In Miscellaneous, Rubber made advances, and Munitions of War did very well. Shipping had various phases.

Business in the Gas Market showed no recovery in point of activity; the aggregate of bargains recorded being again very limited. It is true that there was a larger number of undertakings in which dealings were marked; but several of these contributed only one—or, at the outside, two—transactions. The general tendency looked firm; many leading issues being quoted *ex div.* with the turn of the fraction in favour of the stock. An interesting item is the elimination of the Austro-German holding of 83,000 shares from the Welsbach Light Company. The Money Market ruled quite easy for the most part, but hardened before the close.

Bargains done for cash during the week were as follows: On Monday, Commercial 4 p.ct. 73½, 74, European 9 3/16, Gas Light ordinary 69 11/16, Imperial Continental 70, 70½, 71, South Metropolitan 77¾, South Suburban 80½, 80¾. On Tuesday, Continental Union 36½, Gas Light ordinary 71, 71½, ditto debenture 55. On Wednesday, Bournemouth "B" £11 4s. 3d., £11 5s., Gas Light ordinary 71, 71½, 71¾, 72, Liverpool 84½, Newcastle 73½, South Metropolitan debenture 56. On Thursday, Cardiff 5 p.ct. 89¾, Gas Light ordinary 71, 71½, 71¾, Imperial Continental 70, 71, Newcastle 73½, 74, South Suburban 80½. On Friday, British 33 13/16, 34 1/16, European 9⅝, Gas Light ordinary 69, 69½, 69¾, 71¾, ditto preference, 67¾, Newcastle 73½, 73½, Primitiva preference 60s., 61s. 3d., South Metropolitan 75, South Suburban 80½. On Saturday, Gas Light preference 68½.

The Bank rate is 5½ p.ct., as fixed on the 18th of January.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex. Dividend.	Previous Div on Dividend and Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	65—70	..
1,551 868	,,	April 8	2½	5⅛%	Alliance & Dublin Ord.	59—64	62—64	..
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	58—63	..
280 000	5	April 29	7½	4/6	Bombay, Ltd.	5⅞—6⅜	4⅜—5⅛	..
50,000	10	Feb. 26	16	15/-	Bournemouth Gas and Water (10 p.c. / B 7 p.c. / Pref. 6 p.c. / 4 p.c. Deb.)	29—30	25—27	..
383 110	10	,,	7	7/-		15—15½	11—11½	11/4/3—11/5
115,000	10	,,	6	6/-		13½—14	9½—10	..
159,740	—	—	—	4%		..	71—73	..
992,045	Stk.	Feb. 26	14	55/-	Brentford A Consolid.	261—266	83—85*	..
731 930	,,	,,	11	53/9	Do. B New	204—209	80—82*	..
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	83—88*	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—93	67—69	..
217,380	,,	Feb. 26	11	10½%	Brighton & Hove Orig.	208—213	160—165	..
244,209	,,	,,	8	7¾%	Do. A Ord. Stk.	154—159	115—120	..
530 000	20	Mar. 26	12½	22/6	British	44—45	34—35	33 13/16—34 1/16
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	66—68	..
245,771	,,	,,	4	4%	Buenos Ayres 4 p.c. Deb.	85—87	57—60	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1⅜—2⅛	1⅛—1⅜	..
100,030	10	—	—	4⅛%	Do. 4½ p.c. Pref.	4—6	4⅛—5	..
100,000	Stk.	June 26	4½	4⅛%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	82—83	..
1,513,280	,,	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	71—73*	73½—74
560 000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	65—68*	..
475,000	,,	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	52—54	..
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	36—38	36½
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	58—60	..
278,400	—	—	—	11⅛%	Croydon B and C 7 p.c..	..	175—185	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5⅛%†	Derby Con. Stk.	123—125	100—105	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—83	..
1,032,180	10	July 29	10	7/6	European, Ltd.	17½—18	9—10	9 7/16—9⅝
16,313 430	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke (4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb. / 10 p.c. Bonds)	98—102	69—71*	69—72
2,600 000	,,	,,	3½	3½%		76—79	54—57*	..
4,052,235	,,	,,	4	4%		96—99	67—69*	67½—68½
4,674 850	,,	June 11	3	3%		72½—74½	54—56	55
130,000	,,	,,	10	10%		..	..	..
2 8,740	,,	Mar. 12	5	4½%†	Hastings & St. L. 3½ p.c.	87—89	78—83	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	16½—16⅝	8—9	..
26,600	—	—	—	9½%	Hornsey 7 p.c..	..	125—135	..
181,000	Stk.	Mar. 12	7⅜	7⅜%	Ilford A and C.	151—154	105—110	..
65,780	,,	,,	6⅜	5⅜%	Do. B	115—118	82—87	..
65,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	71—74	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	70—75	70—71
1,235,000	,,	Feb. 12	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	58—61*	..
235,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. (A / B)	211—213 / 146—148	80½—82½*	84½
306,083	,,	June 26	4	4%	Do, 4 p.c. Pr. Deb. Stk.	..	72—74	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4⅛—4⅜	3⅞—4⅛	..
250,000	100	April 1	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	89—93	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11⅛—12	8—8½	..
1,875,892	Stk.	July 29	4½	4⅛%	Newcastle&Gatsh'dCon.	98⅝—99½	73½—74½	73½—74
529,705	,,	June 26	3½	3½%	Do. 3½ p.c. Deb.	82—83	73—75	..
55,940	10	Feb. 26	7/14/0	7/8/-	North Middlesex 7 p.c..	14—15	10½—11⅛	..
300,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	104—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅞	2—3	..
60,000	50	Feb. 26	13	12½%	Portsea, Island B	128—131	92—97*	..
100,000	50	,,	12	11%	Do. C	118—121	85—90*	..
52,000	50	,,	10	9%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5⅛—6	1 7/16—2⅛	55/—65/- 60/—61/3
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝—5	55/—65/-	
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	78—80	..
—	—	—	—	4%	Do. ,, ,, 1911	..	..	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	61—67	..
150,000	10	May 14	6	6/-	San Paulo (6 p.c. Pref. / 5 p.c. Deb.)	10½—11	8—8½	..
125,000	50	July 1	5	5%		47—49	42—44	..
135,000	Stk.	Mar. 12	10	10%	Sheffield A	223—224	188—192	..
209,984	,,	,,	10	10%	Do. B	222—224	188—192	..
523 500	,,	,,	10	10%	Do. C	220—222	188—190	..
90,000	10	May 28	9	6/-	South African.	10⅜—11⅛	..	..
6,609,895	Stk.	Feb. 10	5/4/0	46/8†	South Met. 4 p.c. Ord.	111—113	75—77*	75—77½
1,895,445	,,	July 10	3	3%	Do. 3 p.c. Deb.	72⅛—74⅛	54—56	56
224,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	157—159	144—146	..
952,795	,,	,,	6	4⅞%	S'th Suburb'n Ord. 5 p.c.	114—116	80—82	80½—80⅞
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	79—81	..
135 000	,,	—	—	4⅞%	Do. West Kent	..	..	..
187,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—90	..
647,740	,,	May 14	5	5%	Southampton Ord.	99—102	77—79	..
120,000	,,	Feb. 12	7½	7½%	Tottenham District (A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.)	135—138	95—100*	..
782,275	,,	,,	6	5⅝%		115—117	68—73*	..
181 255	,,	June 26	4	4%		87—89	65—67	..
182 380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	60—65	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max..	108½—109½	91—92	..
30,000	,,	Feb. 26	8⅜	80/-†	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c..	151—156	117—122	..
255 636	,,	,,	6¼	65/-†	Do. B 3½ p.c.	129—134	101—103	..
108.075	,,	,,	5/17/8	56/-†	Do. C 3½ p.c.	110—115	88—93	..
852,000	,,	,,	6¼	58/9†	Wimbledon 5 p.c.	117—122	90—95	..
98,000	,,	,,	6⅜	65/-†	Epsom 5 p.c.	121—126	98—103	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	51—54	..

* Ex. div. † Next dividend will be at this rate.

Gas-Bracket Heater Fatality.—At Mytholmroyd last week, an inquest was held on the body of Mr. David Helliwell, aged 74, who died from gas poisoning. On the gas-bracket in the bedroom in which he was found dead, there were three taps—one near the wall, another in the centre to feed a bunsen burner on which was a heater to warm the room, and a third for the ordinary gas-jet. A police constable said that when he went into the room the wall-tap and the bunsen tap were on full; and there was a light at the jet. Gas was escaping from the bunsen. The Coroner suggested that the heater had been used the previous night, and the gas not turned off; or that the bunsen had not been properly lighted, and had gone out. The Jury found that the deceased had died from gas-poisoning through an accidental gas escape.

Messrs. Bale and Church, Ltd., intimate that they have removed from No. 5, Crooked Lane, E.C., to No. 33, St. Mary at Hill, E.C.

By not lighting any of the street-lamps from the beginning of April to the end of September, Bristol hopes to release lamplighters for national service.

A Company has been registered under the title of Lumina, Limited, with a capital of £4000, to carry on the business of incandescent mantle and illuminating device manufacturers, and dealers in thorium, nitrate, &c.

News was received some days ago of the sinking, with loss of life, of the steamer *John Miles*, which was regularly chartered by the Brighton and Hove Gas Company, and was specially designed for coal carrying. Four injured members of the crew and the dead bodies of two others were landed; while some more were missing. Messrs. Stephenson Clarke and Co. were the owners of the steamer.

The British Commercial Gas Association was represented at the meeting of the London Safety First Council by Mr. F. W. Goodenough, the Chairman of the Executive Committee, and Mr. Leon Gaster (the Hon. Secretary) represented the Illuminating Engineering Society.

An explosion which it is thought was caused through an accumulation of gas in the old tramway conduit, occurred last week in the thoroughfare at the back of the Arcade at Bournemouth. Some 30 yards of the centre of the tram-track were lifted up, exposing the old conduit formerly used for the underground live-rail system. In other places near by similar explosions took place; and the tramway traffic was interfered with.

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral Countries unless they are posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

SECRETARY. Bristol Gas Company.
SECRETARY (100 Million Works). No. 6287.
ENGINEER'S ESTIMATING DEPARTMENT. No. 6285.
CARBONIZING FOREMAN. No. 6271.
FOREMAN (METER WORKS). No. 6283.
ELECTRICIAN (Charge of Installation). No. 6274.
GAS STOKERS. No. 6289.

Appointments, &c., Wanted.

GAS ENGINEER. No. 6279.
MANAGER OR MANAGER AND SECRETARY. No. 6280.
REPRESENTATIVE. No. 6281.

Plant, &c. (Second Hand), for Sale.

EXHAUSTER, &c. No. 6284.
EXHAUSTERS, HYDRAULIC MAIN, &c. Broadstairs Gas Company.
TANKS. No. 6288.

Trading With the Enemy Act Sale.

BRITISH INCANDESCENT MANTLE WORKS. Tenders by March 19. Particulars and orders to view of Wheatley Kirk, Price, and Co., 46, Watling Street, E.C.

TENDERS FOR

Retort Renewals.

LOUGHBOROUGH GAS DEPARTMENT.

ROYAL 8VO. CLOTH GILT, LETTERED, 15s. NET.

Clauses and Precedents in
ELECTRICITY, GAS, & WATER LEGISLATION.

Being a Comparison of the Provisions contained in the Model Bills, in Special and Municipal Acts, and in Provisional Orders, 1910 to 1914, relating to these Public Services.

Compiled and noted by **JACQUES ABADY,** of the Middle Temple, Barrister-at-Law

WALTER KING, "GAS JOURNAL" OFFICES, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 23s. 6d.; Half Year, 12s.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, an extra charge of 4s. a year is made.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.
In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4,500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—

BALE AND HARDY,
89, VICTORIA STREET, WESTMINSTER, S.W.

OXIDE OF IRON.
SPENT OXIDE WANTED.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.
Phone: Avenue 6680.

ROBERT DEMPSTER & SONS, Ltd. Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

TAR DISTILLATION.

SUCCESSFUL and Up-to-Date Firm of Chemical Manufacturers would SUPERVISE the ERECTION and WORKING of a Limited Number of New Plants and undertake the Sale of Products on a Percentage Basis.
Address No. 6265, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD., 36, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

"FERROX." "FERROX." "FERROX."

A BRITISH Oxide Cheaper and Better than Bogore. 35 per cent. Water, 75 per cent. Ferric Hydrate. For Sale outright or on Loan.
OXIDE LIMITED, Brentford, MIDDLESEX.

MEWBURN, ELLIS, AND PRYOR.

CHARTERED PATENT AGENTS AND TRADE MARK AGENTS,
70, Chancery Lane, London.
Telegrams: "Patent London." 'Phone: 243 Holborn,
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams—"SATURATORS BOLTON." Telephone 0848.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Feb. 13, p. 278.

BENZOL PLANTS FOR GAS-WORKS.

BAGLEY, MILLS, & Co., Ltd., 92, Victoria Street, Westminster, S.W., invite enquiries from all gas-works making 75 million cubic feet and upwards per annum.
See illustrated Advertisement Feb. 20, p. III. of Centre.

ALDER AND MACKAY (ESTABLISHED 1850.)
WET AND DRY METERS,
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.
EDINBURGH.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

GAS Manager and Accountant, disengaged, seeks Appointment as MANAGER or MANAGER and SECRETARY.
Apply No. 6280, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED—Gas Stokers, ineligible for the Army, as follows: LEADING STOKERS, 7s. per day of 12 hours, including War Bonus. UNDER STOKERS, 6s. 2d. per day of 12 hours, including War Bonus. Both have Holiday with Pay.
For further Particulars, apply to No. 6289, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED—For the duration of the War, SECRETARY for 100 Million Gas Company. Capable of performing the Whole of the Secretarial and Accounting Duties, with Unskilled Assistance only.
Apply, by letter, stating Age, Experience, and Salary required, to No. 6287, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

THE Bristol Gas Company invite Applications for the Post of SECRETARY. Age not to exceed 45. Previous Experience in Gas-Works Office essential.
Salary to commence, £700 a Year.
Applications, by letter only, to the CHAIRMAN, the Bristol Gas Company, BRISTOL.

GENTLEMAN, well connected with Gas Undertakings, is open to Engagement to REPRESENT High-Class Firm—Meters, Stoves, Fittings, Stores, or Plant. Highest References.
Address, in first instance, to No. 6281, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, for 800 Million Works, a Capable CARBONIZING FOREMAN. Must be good Carbonizer and have had Experience of Electrical Stoking machinery. Good wages paid to right man.
Also a thoroughly Competent ELECTRICIAN, to take Complete Charge of Installation.
Apply, by letter, stating Age, Wages, and full Experience, to No. 6274, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

GAS Engineer, Experienced in all Departments, is open to APPOINTMENT, and prepared to take up duties at once.
Address No. 6279, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

DRY GAS-METER WORKS.

WANTED — Experienced Foreman. Good Wages and Good Prospects to an Efficient, Reliable, and Six o'clock Man.
Apply, by letter, giving full Particulars, Present Position, and Wages required, to No. 6283, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED by a Firm of Engineers Engaged on War Work a Capable Man for ESTIMATING DEPARTMENT. Must have Drawing Office Experience and an all-round Knowledge of General Engineering. Must also be Exempt from Military Service.
Reply, by letter, stating full Particulars as to Experience, Age, Salary required, to No. 6285, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

PLANT Wanted.—Discarded Apparatus, Scrap Materials PURCHASED and REMOVED. Prompt Attention.
FIRTH BLAKELEY, SONS, AND CO., LTD., Gas Engineers and Dismantlers, CHURCH FENTON, LEEDS.

WANTED—Pitch Coke.
State Price Delivered in Manchester Area and Quantities Available, to No. 6276, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE.—One 3-Blade Exhauster, Complete with Valves and Pully, but without Connections. Capacity, 23,000 c. ft. per Hour. Condition as new.
Address No. 6284, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

SULPHATE Plant—Splendid Half-Ton per Day Plant Complete. Has done little Work, and is in Perfect Order and Condition. Cheap for Sale before Removal.
Address No. 6277, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

TANKS! TANKS!! TANKS!!!

THREE converted Boiler Tanks, Flat ended, 18 ft. by 7 ft. 6 in. (about 5000 galls. each), in First Class Condition. Offers wanted. A low price will be taken for quick Sale. Loaded f.o.r.
Apply No. 6288, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE — One Bryan Donkin's EXHAUSTER to pass 40,000 cubic feet per Hour.
One Bryan Donkin's ENGINE and COMPRESSOR to pass 30,000 cubic feet per Hour.
Nine 10-in. Bryan Donkin's RACK and PINION VALVES.
One No. 5 Gardner's GAS-ENGINE COMPRESSOR.
Two SCRUBBERS, 30 ft. by 5 ft., with Wood Filling.
Apply to the MANAGER, Gas-Works, BROADSTAIRS.

GAS PLANT for Sale.—We can always offer New and Second-Hand Gas Apparatus, including Retorts and Fittings, Condensers Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

TANKS FOR SALE—

Three	Egg-end BOILERS	5 ft. diam. by	32 ft.
Four	,, ,,	5 ft. ,,	,, 27 ft.
Two	,, ,,	5 ft. 3 in. ,,	,, 34 ft.
One	,, ,,	6 ft. ,,	,, 28 ft. 6 in.
One	,, ,,	5 ft. 6 in. ,,	,, 25 ft.
Two	Flat-end ,,	7 ft. ,,	,, 28 ft.
Two	,, ,,	5 ft. ,,	,, 28 ft.

Also Several Others.

AIR RECEIVERS.

Three	High-Pressure RECEIVERS	4 ft. 4 in. diam.	by 19 ft. long.
Two	,, ,,	3 ft. 6 in. diam.	by 18 ft. long.
Two	,, ,,	1 ft. 6 in. diam.	by 14 ft. long.
One	,, ,,	6 ft. diam.	by 24 ft. long.

Large STEEL TANKS 20 ft. by 47 ft. diam., with Covers.
Ask for Stock List. Particulars and Prices on Application to FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, near LEEDS.

LOUGHBOROUGH CORPORATION.
(GAS DEPARTMENT.)
RENEWAL OF RETORTS.

TENDERS are invited by the Gas Committee for the RENEWAL of Two Through Beds of Retorts.
Further Particulars may be obtained from
EDWARD ONIONS,
Engineer and Manager.
Gas-Works,
Loughborough.

TRADING WITH THE ENEMY (AMENDMENT) ACT, 1916.

RE THE BRITISH INCANDESCENT MANTLE WORKS, LIMITED.
By order of THOMAS WISE, Esq., F.C.A., the person Appointed as Controller by the Board of Trade

WHEATLEY KIRK, PRICE, & CO. WILL SELL BY PUBLIC TENDER, in ONE LOT,
The Substantial and Modern FREEHOLD FACTORY BUILDINGS situate in Wandsworth, a few minutes' walk from Earlsfield Station—together with the ENTIRE UP-TO-DATE EQUIPMENT of MACHINERY, PLANT, FIXTURES, TOOLS, UTENSILS, FURNITURE, &c., for MAKING INCANDESCENT GAS-MANTLES.
The Factory is in Full Work, fitted with Labour Saving Appliances of latest Type, and is considered to be a Model Factory in all respects.
Particulars (with Plan) and Conditions of Sale can be obtained on Application to THOMAS WISE, Esq., F.C.A., The Controller, Bassishaw House, BASINGHALL STREET, E.C., or from the Solicitors, Messrs. CLARKE RAWLINS & Co., 66, Gresham House, OLD BROAD STREET, E.C., or from the SELLING AGENTS, WHEATLEY KIRK, PRICE, & Co., 46, WATLING STREET, E.C., who will give Orders to View to intending Purchasers.
Tenders must be Delivered on or before Noon on Monday, the 19th of March, 1917, at the Offices of the Selling Agents as above.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at THE MART, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C.

CARBURINE FOR GAS ENRICHING
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
The GAS LIGHTING IMPROVEMENT CO., Ltd.,
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4451, 4452, 4453, and 4454 London Wall.
Telegraphic Address: "Carburine, London."

R. LAIDLAW & SON (EDIN.) LTD.
GAS METER MAKERS.
ORDINARY & PREPAYMENT METERS
REPAIRS AND CONVERSION OF ORDINARY TO PREPAYMENT METERS RECEIVE PROMPT ATTENTION.
LONDON & EDINBURGH.